LIBRARY OF CONGRESS
MAR 13 1905
SMITHSONIAN DEPOSIT.

THE AMERICAN GAS LIGHT JOURNAL

REDMAN & KENNY, N.Y.

PUBLISHING OFFICE No. 42 PINE STREET

DEVOTED TO THE INTERESTS OF ILLUMINATION, HEATING, MECHANICAL, CHEMICAL AND GENERAL SCIENCE.

VOLUME LXXXII. No. 11. Whole No. 1,553. | NEW YORK, MONDAY, MARCH 13, 1905. | $3 PER ANNUM, IN ADVANCE.

A. M. CALLENDER & CO., Proprietors. C. E. SANDERSON, Manager.
THOMAS J. CUNNINGHAM and ELBERT P. CALLENDER, Editors.

ENTERED AT THE POST OFFICE AT NEW YORK, N. Y., AS SECOND-CLASS MATTER.

Published on each Monday of the year, at No. 42 Pine Street, New York.

Telephone.—2996 John.

The **American News Company,** Nos. 39 and 41 Chambers street, New York, are agents for this JOURNAL. Newsdealers will send orders to them. All payments to be made in advance. Single copies, 10 cents.

Terms of Subscription, Including Postage.—For the United States and Canada, $3 per annum. European countries, $5 (£1—25 francs).

Remittances should be made either by post office order, express money order, registered letter, or bank draft on New York, payable to the order of A. M. Callender & Co.

Correspondence.—Wishing to make this JOURNAL a gazette of intelligent discussion to those of our readers who may wish to gain or give information on the subjects to which its columns are devoted, correspondence is solicited for publication from all who make the study of those subjects a pleasure or a profession.

Books.—We will forward by express, at publisher's lowest rates, any book—scientific or otherwise—to any address in the United States or Canada. We would suggest to our patrons that to avoid the risk and expense consequent on sending us the money (we do not send books C. O. D.), that orders for books be sent us through the Purchasing Department of the American Express Company.

The Public Lighting Tables of the American Meter Company will be found in the page advertisement of that Company.

CONTENTS.

An Asterisk (*) denotes an illustrated article.

OFFICIAL NOTICES—
Twenty-first Annual Meeting, Ohio Gas Light Association..... 401
Respecting the Official Work of the American Gas Light Association..... 402

EDITORIALS—
Briefly Told..... 402
Making the Record Straight—A Well Deserved Promotion—The Gas Legislation Outlook—Notes.

The Thirty-fifth Annual Meeting of the New England Association of Gas Engineers—Continued from Page 367..... 402
First Day, Morning Session—Discussing the Paper, by Mr. Walter R. Addicks, of New York, on Gas Mantles and Gas Mantle Lamps from a Commercial Standpoint—Report of Committee on Nomination of Officers—Election of Officers—The Colonel's Response—First Day, Afternoon Session—Some Practical Record Sheets, by Mr. W. L. Walker—Discussion—*Concentrating Ammoniacal Liquor, by Mr. D. D. Barnum.

Abstract of Broceedings, Fourth Annual Meeting, Wisconsin Gas Association..... 407
First Day, Morning Session—Routine Business—Report from the Executive Committee—Some Commercial Problems of a Gas Business, by Mr. David Douglas—First Day, Afternoon Session—President Pratt's Annual Address—Committee on President's Address.

Improved Method of Making Firebrick..... 411

The Outlook for Electrical Engineers..... 411

The Electrical Mysteries of the Sun..... 412

ITEMS OF INTEREST FROM VARIOUS LOCALITIES..... 412
Mr. Cook will Light the Residents of Susquehanna, Pa.—More Turmoil at Wilkes-Barre, Pa.—Sandy Hill, N. Y., Remains "Independent"—Annual Meeting, Gettysburg, Pa.—Changes at Houston, Tex.—Annual Meeting, Patersou and Passaic, N. J.—Changes at South Amboy, N. J.—Mr. E. N. Dickson Goes to the Milwaukee Company—Changes at Grand Rapids, Mich.—Personal—A Hint from Louisville, Ky.—Something from Meriden, Conn.—Death of Mr. Edwin Aldrich—Legal Gas Rate, San Francisco—And Other Items.

The Market for Gas Securities..... 414

[OFFICIAL NOTICE.]

Twenty-first Annual Meeting of the Ohio Gas Light Association.

OHIO GAS LIGHT ASSOCIATION,
OFFICE OF SECRETARY,
DELAWARE, O., Feb. 14, 1905.

The Twenty-first annual meeting of the Ohio Gas Light Association will be held at Pittsburg, Pa., March 15th, 16th and 17th.

The President, Mr. F. W. Stone, of Ashtabula, O., will call the meeting to order on Wednesday, March 15th, at 9:30 A.M., in Assembly Hall, Hotel Schenley, the headquarters.

The following technical matters will be presented at the meeting:

"Question Box;" edited by Mr. Henry L. Doherty, New York city.

"Progress Department;" edited by Mr. Irvin Butterworth, Grand Rapids, Mich.

"Novelty Advertising and New Business Methods Department;" edited by Mr. B. W. Perkins, South Bend, Ind.

"Wrinkle Department;" edited by Mr. E. E. Eysenbach, Binghamton, N. Y.

"Information Bureau;" edited by Mr. H. L. Olds, Lincoln, Ills.

"Bureau of Forms and Records;" edited by Mr. D. W. Low, Alliance, O.

Reports of Committees.

"Question Box, Revision Board;" Dr. H. B. Harrop, Chairman, Milwaukee, Wis.

"Uniformity of Gas Meters;" Alten S. Miller, Baltimore, Md.; Donald McDonald, Albany, N. Y.; R. Shacklette, Adrian, Mich.

"Standard Sizes for Coke;" C. W. Andrews, Duluth, Minn.

"Uniform System of Mapping Mains;" W. H. Barthold, Grand Rapids, Mich.

"Standard Methods of Testing Fuel Gas Appliances;" Henry L. Doherty, New York city; F. W. Stone, Ashtabula, O.; John Franklin, Cincinnati, O.

"Flow of Gas in Pipes;" J. D. Shattuck, Chester, Pa.; H. A. Carpenter, Pittsburg, Pa.; J. O. Johnston, Columbus, O.

"Standard Methods of Construction and Operation of Coal Gas Benches;" W. A. Baehr, St. Louis, Mo.

"Fuel Economies;" C. H. Williams, Madison, Wis.

Set Papers.

"Removal of Last Traces of Oil and Tar from Water of Condensation;" by Mr. James S. McIlhenny, Washington, D. C.

"Piping Gas Long Distances;" by Mr. W. H. Hammon, Pittsburg, Pa.

"Installation and Care of Exhausters;" by Mr. E. D. Johnson, Connersville, Ind.

"Producer Gas;" by Mr. Edward R. Wood, Jr., Philadelphia, Pa.

"Power Production from Gaseous Fuel;" by Mr. J. R. Bibbins, Pittsburg, Pa.

An opportunity will be given any of the speakers present at the meeting to correct their remarks before leaving Pittsburg, but not after, as all of the reports will be turned over to the printer immediately after the meeting.

The Hotel Schenley is conducted on the European plan, and the following rates have been secured for the meeting: For single room without bath, occupied by one person, $2 per day; single room with bath, occupied by one person, $3 per day; room without bath, occupied by two persons, $3 per day; room with bath, occupied by two persons, $4 per day.

The Schenley is a most modern hotel, pleasantly located at the entrance to Schenley Park, and can be reached by trolley within 15 minutes from all railroad depots. They hope to entertain all of the Association and will put forth every effort to make the members comfortable. The most satisfactory quarters are always obtained by writing in advance to the hotel people.

Pittsburgh is one of the most interesting towns in the country for gas men, and the local Entertainment Committee has arranged the following programme: Wednesday evening, March 15th, smoker and vaudeville entertainment in the ball room of the Hotel Schenley; Thursday evening, Alvin Theater, to see Ida Conquest; Friday afternoon, at 2 o'clock, special trolley cars will leave the hotel to carry parties in three different directions as follows: One party to the Carnegie Steel Works, one party to the National Tube Works and Gas Works, and another to the Westinghouse plants. The local Entertainment Committee numbers the following:

Joseph F. Guffey (Chairman), the Philadelphia Company; Alam Leamy (Secretary), the Welsbach Company; George W. Barnes, the Equitable Meter Company; Henry I. Lea, the Westinghouse Company; E. W. Crawford, the Chaplin-Fulton Company; Robert Munroe, the Reineke-Wilson Company; T. C. Clifford, the Pittsburgh Meter Company; Peter Young, the James Gardner, Jr., Company; H. J. Hoyt, the American Meter Company; Robert McGonigle, the Pittsburgh Light and Mfg. Company; J. M. Daffron, the Asbestos Pipe Company.

The Secretary will furnish with pleasure application blanks for membership, and any other information which may be desired.

T. C. Jones, Secretary.

[Official Notice.]

Respecting the Official Work of the American Gas Light Association.

American Gas Light Association,
Secretary's Office,
530 Broadway, N. Y., Dec. 13, 1904.

To the Members American Gas Light Association: As there seems to be some misunderstanding respecting the standing of the official management of the Association, members will please note that the undersigned is the Secretary of the Association, and that Mr. A. E. Forstall is carrying forward the work of the Practical Class. All correspondence in connection with the Practical Class should therefore be addressed to Mr. A. E. Forstall, 58 William street, and all other matter pertaining to the Association to Mr. George G. Ramsdell, Secretary, at the above address.

BRIEFLY TOLD.

Making the Record Straight.—It will likely be noticed that our current report of the proceedings of the New England Association of Gas Engineers, as to its Thirty-fifth Annual Meeting, which was held in Boston some days less than a month ago, is neither "Official, nor Revised by the Secretary." In so far as the designations go it is also noted that our installment for last week should have been fatherless. The Secretary (Mr. N. W. Gifford) has been so busy that he could not get the matter together, hence those who wish to read the proceedings will have to wait for an "unscooped" record. Meantime it gives us pleasure to say that if, in our report so far printed respecting the meeting, anyone has been either misquoted or misreported, our columns are open to such for the most complete correction possible.

A Well Deserved Promotion.—A correspondent in St. Louis, writing under date of the 4th inst., says: "Perhaps it was an oversight on your part, but from whatever cause the omission should be charged, I think it is right that public mention in your paper, which has always been regarded by gas men as a standby for the industry, should have been made of the promotion of a man who, in our city, bears the good will of all. I refer to Mr. William Dodd, who was recently elected Treasurer of the Laclede Gas Light Company, succeeding Mr. C. A. Tucker, on the resignation of the latter. Mr. Dodd has been with the Company since 1883, beginning as office boy and going on in his careful way until his present prominence was attained. He is well liked; as he should be.—P."

The Gas Legislation Outlook.—As was remarked in our financial columns some time ago, the likelihood that cheaper gas would be ordered for New York city this year was discountenanced. Bad faith cannot exist permanently, and ex-Governor Odell and his friends are now apparently at least partial believers in that fact. However, as to whether or not faith was broken last spring respecting certain New York city gas measures, it looks at the time that if cheaper gas is to be for New York city it will also be for other cities in New York State. A general law is that which is desired by those who believe in "fair and equal treatment to and for the public."

Notes——

Mr. S. J. Lowe has resigned the dual berth of Secretary and Treasurer to the Clarksville (Tenn.) Gas Company so that he might accept the position of Superintendent of Distribution to the Chattanooga (Tenn.) Gas Light Company.

Messrs. John Kokernot, N. M. Washer and Frank Grice have been chosen Directors in the San Antonio (Tex.) Gas, Electric Light and Traction Company, vice Messrs. A. W. Houston, James R. Davis and John Boyle.

At a special meeting of the Claremont (N. H.) Gas Light Company, held in the office of the Monadnock Mills, Claremont, last Wednesday, a permanent organization was effected. The Company will shortly (in fact now is) be in the market for the necessary complement of gas producing apparatus.

[Continued from Page 367.]

THE THIRTY-FIFTH ANNUAL MEETING OF THE NEW ENGLAND ASSOCIATION OF GAS ENGINEERS.

Held in Young's Hotel, Boston, Mass., Feb. 15 and 16, 1905.

First Day—Morning Session.

[Discussing the paper[1] by Mr. Walter R. Addicks, of New York, on "Gas Mantles and Gas Mantle Lamps from a Commercial Standpoint."]

The Vice-President—This very interesting paper of Mr. Addicks is before you. I am sorry the author is not here to help us in the discussion of a subject in which we are all interested, the maintenance of arc lamps. Is Mr. Motley, of Lowell, here?

Mr. Motley—Our Superintendent, Mr. Pease, has this matter in hand more than I have. He will answer any questions.

The Vice-President—We would like to hear from Mr. Pease.

Mr. Pease—I have some figures here that are not much different from those presented by Mr. Hintze last year. The only difference this year is that we have made a charge for installation. We are getting but $2 a year for attention to lamps, and except for depreciation we figure that we come out whole on this. We don't make weekly inspections; we make them about once in five weeks. We have about the same number of lamps as last year—nearly 3,000.

The Vice-President—I understand that at Lowell you furnish the lamp and charge $2 a year for maintenance; is that correct?

Mr. Pease—Yes, sir; and charge now for installing it.

The Vice-President—How much do yon charge for installing?

Mr. Pease—Actual cost.

The Vice-President—How much does that amount to?

Mr. Pease—I don't know exactly. It is sometimes $2; never over $5.

The Vice-President—It depends on the location and on the piping you have to do?

Mr. Pease—Yes, sir.

The Vice-President—That is the first charge to the customer?

Mr. Pease—At actual cost.

The Vice-President—Has anyone else anything to say on this matter of maintenance of arc lamps? Mr. Nettleton, will you give us your experience?

Mr. Nettleton—Mr. President, we have not at New Haven put out any lamps without charge. In all cases, so far as I recall, certainly all cases for 2 or 3 years, we have sold the lamp, generally at a price of $7. The lamps have been sold for cash if the parties were willing to pay; they have been sold on installments if it were necessary. We have undertaken to care for the lamps if the parties wished us to do so, and we are now caring for about 1,000 lamps, charging 25 cents per month per lamp. This gives an inspection once in two weeks. It replaces all of the broken glass there, all of the mantles, all the parts. Mr. Burrill, who is too modest to speak, who has charge of that department, is fur-

1. *Ante*, p. 365.

nishing the information. We do not furnish the glassware. On a basis, however, of the labor and furnishing the mantles, and all repairs connected with it, except the labor of making out the bills, our costs are now a trifle under 25 cents per month. They were very much larger. At one time they exceeded 40 cents a month; but, thanks to the efforts of Mr. Burrill, who has charge of that, the costs have been reduced, as you see, very materially. I believe it can be done for 25 cent. I regret very exceedingly that Mr. Addicks is not here, because I would like to question him on the matter of the rentals that can be charged for these lamps. Personally I had not supposed that, as he indicated, either $1 a month rental could be obtained, or we could get 40 cents per month for the care. It would be nothing wonderful if I found myself mistaken in that. But I do know that the lower we can make that charge the more lamps we can take care of, and the more lamps we can take care of the better the service that will be given by the lamps. I believe firmly, however, in the matter of selling the lamps. When people have paid for them, even if they have paid only $2 down, they have an ownership. With most of them they keep on and pay the balance; some do not. Now, when that ownership is complete, they are very much more interested in the lamp than if it belongs to the gas company. They can give it up because, as our electric friends say, they are heaters, and hot weather comes on in the summer time, or because the lamp is unsatisfactory, or because the electric company make a lower rate, as some of them kindly do, and a flat rate equal to the cost of the gas—for all of those reasons, and perhaps many others, the consumer may be tempted to throw the lamp out, but if he owns it he will hesitate. It seems to me that our interest lies in the selling of the lamp wherever it is possible, and personally I should very strongly favor, if it were necessary, the selling at very much less than cost, rather than putting out and getting a rental which will cover it.

Mr. Morrison—This is a very important matter. The gas arc is probably the source of fully as much revenue as is the stove. As I am in the attitude of one looking for information, I wish those who speak would give us the consumption per year, the number of inspections and the number of lamps inspected per man per day.

The Vice-President—Can you give us that information for Lowell, Mr. Pease?

Mr. Pease—Average lamps inspected per man per day, 28; average mantles used per lamp, ¼ of a mantle; that is, once in 5 weeks; 50 weeks, it would be about 8 mantles for a 4-mantle lamp per year, or a mantle every 6 months.

The Vice-President—Mr. Nettleton, can you give us the information for the number of lamps inspected?

Mr. Nettleton—I am sorry that I am not able to do it offhand; I understand that a gentleman now in the room, Mr. Dudley, has been collecting information on this point from various gas companies. If he were willing to talk to the Association, I am sure that we would all get considerable from him.

The Vice-President—Mr. Dudley, we will be pleased to hear from you.

Mr. Dudley—Mr. Chairman, I have been investigating this matter to some extent, but at the present time have not the information in form. There seems to be a great variety of opinion as to the required number of inspections which a lamp needs in 1 month. One object in view was to determine the number of calls which a lamp will need. In some places one inspection a month is made, in other places as high as four inspections a month are made, but it seems the consensus of opinion that an arc lamp can be maintained in first-class condition by three inspections. Of course, local conditions govern this to a great extent. For instance, take a gas arc in a market in the summer time, when the flying bug pests are seen and felt, it will need more frequent inspection. An arc hanging in a place that has a great deal of dust will get clogged very easily and need official inspection on that account. On the matter of consumption there is also a variety of opinion, of course. Some companies estimate as low as 15,000 cubic feet per year, others run as high as 28,000, so it is a very hard matter to form an average, but I think an arc lamp will average to burn 20,000 cubic feet of gas a year, and in comparison with a gas range it is in many instances considered more valuable. Of course, from the fact that a gas arc lamp burns gas at the illuminating rate in very many companies it gives an advantage. A question was asked relative to the number of mantles. That, of course, depends somewhat on the grade of mantle used. I think the higher grade mantle, or a very good mantle, is cheaper in the end than the poorer grade one. It not only costs less, but keeps the arc lamp in better condition, and is a better advertisement for the gas company and for the arc lamp. The mantles required will vary in number. Some companies will maintain an arc lamp with as low as 10 mantles in a year, others will require as high as 22—some run higher than that; but under ordinary conditions an arc lamp seems to require an average of 1 mantle per month. That would be a good, low average, if an arc lamp was maintained with 1 mantle per month. At that rate the maintenance cost could be kept at a nominal rate. I would like to find out if possible if any gentleman here has had the experience or has ever figured up the consumption per arc. It is a very difficult thing to get the actual consumption, because very few stores burn gas through the gas arc exclusively. Very often they have small burners or small appliances running from the same meter. But in some cases it can be ascertained. For instance, I recall the Woolworth 5 and 10-Cent Stores. A great many of them—most every one, in fact—use the gas arc inside and the electric arc in the window. Downstairs they will use the small incandescent burners. So all the gas that is burned in the Woolworth stores is generally burned through the gas arc, and in that case and in similar cases it is possible to get an average consumption. Possibly some of the gentlemen here have figured on that line. I have attempted to do it, and find as I say a great variety, but the average runs very close to 20,000 cubic feet of gas per arc, which is a very good consumption.

Mr. Pease—Mr. Dudley asked a question about the consumption of a gas lamp. There were meters put on 10 lamps, and they averaged 16 feet per hour for a 4-mantle lamp, or 4 feet per burner.

The Vice-President—Can Mr. Higgins give us any information on this subject?

Mr. Higgins—I suppose, gentlemen, Mr. Erhard could furnish you with some figures from our Company which would not perhaps be impartial, but which are very interesting.

The Vice-President—We would be pleased to have the figures, if Mr. Erhard will give them to us.

Mr. Erhard—I would say that our experience in arc lighting is that we use about 12 mantles per lamp—about 1 a month—except in extraordinary cases where there is a great deal of vibration or careless handling of the lamp. Where there is a great deal of vibration it is desirable to use an anti-vibrative attachment, which will take the direct vibration out of the lamp. The consumption of a gas arc, roughly, is about 17 feet per hour. It varies. It goes as low as 14, and sometimes as high as 20 under the higher pressures used on some services, depending entirely upon the gas used, its heating value, of course, and the pressure. I think in arc lighting we sometimes neglect the effectiveness of the lamp; that is, where the lamps are simply stuck in stores indiscriminately, with clear globes in places where alabaster globes should be used to tone down the light. One of the greatest arguments against the gas light is the fact that it is not a pleasing light to the public, and that is one of the things to which we should pay the most attention. Very often you lose a little light with the use of an alabaster globe. I say alabaster, because there is a distinction between alabaster glass and opal glass, opal being milky all the way through, alabaster being a clear glass, with a thin plate of white on the inside, the alabaster cutting down the light very much less than would be supposed; as little as 15 per cent. I say that with the use of an alabaster globe, which will very greatly improve the lighting effect and only cut down the light a trifle, we gain a great deal in light. The electric light people you will notice in almost every case use either an opal or an alabaster globe. That is done to get a more even distribution of light. With the electric arc, the open arc or the inclosed arc, with the clear air globe, the intense ray of light or point of light is about 45 below the horizontal. In order to equalize this, or in order to get a more even distribution of light in the room, they use the alabaster glass, which, of course, will break up and spread the light. Now, the same is true of a gas arc light. It is not exactly a desirable thing to throw a bright point of light horizontally from the lamp. It is desirable to give a general illumination of the room and yet throw most of it below the horizontal, and that is best accomplished by the use of an alabaster globe. From very careful tests that have been made we are inclined to think that the pear shaped globe is better, because it throws a great deal more light below the horizontal than it does above. That is merely a small detail. A round globe will throw about half above and half below. A pear shape, whether it is on a single burner or arc light, is preferable, because it throws more below the horizontal, but the use of an alabaster globe is desirable, not only because it gives a better effect in lighting but because it helps in other ways. With a clear glass globe a great deal of time has to be expended on polishing off. Your trimmer has to take care of a great number of lamps. He has not the time to perfectly clean the globe on every inspection, unless he takes a great deal more time than is desirable; but with an alabaster glass very often it is only necessary to dust it. It won't show finger marks, nor

will it show small specks. That experience has also been obtained by the electric lighting people. They try to economize at every turn in order to compete with gas, and one reason why they use alabaster glass is the globes are very much more easily kept clean. Of course in the the past year a great many improvements have been put on the arc lamps of different makes, all tending toward improvement in the increasing of the efficiency of the light. Very great strides have been made in gas arc lamps during the past year, and that will be a very interesting study I have no doubt on the part of some members. The mantle used on an arc lamp of course is one of the most essential details. Personally, as a mantle expert, I would recommend the use of a yellow white mantle; by that I mean a mantle richer in cerium than is generally used to-day in the country. Some mantles that are extremely white give a very glaring effect. When they are put on the lamps new you will say that the lamp gives a beautiful light; in the course of a few days the light seems to greatly deteriorate. That is true with all very white mantles, I mean mantles giving a very white light. A mantle, however, which is toned down in color to give a slightly yellow-white light, not only gives a more satisfactory light, but also makes a more satisfactory mantle. The yellow-light mantle is tougher than the dead-white mantle and will not shrink as much as the dead-white mantle. Its candle power keeps up very much longer. A very white mantle will give a fairly high candle power at the start, but at the end of 1,000 hours' burning will drop sometimes 60 per cent. Starting out we will say on a single burner giving 100-candle power, it will drop 60 per cent. from that; whereas the yellow-white mantle, the same shape on the same burner using the same amount of gas will drop about 15 per cent. You see that the mantle used is one of the most important details in this form or any other form of incandescent light mantle used, so that it is very important to determine just exactly which mantle you want to use, as it has a great bearing on the number of mantles consumed and on the effectiveness of the light. We pay very little attention I think in the gas industry at large to this effecttive light. Electric light people are continually harping against gas lighting as being unsatisfactory, giving a poor illumination or a poor quality of light. You hear it at every turn in every part of the country. As far west as Minneapolis, Sioux City and like places you hear this objection. They distribute pamphlets showing the poor distribution of light, showing that the light is thrown off in bright bands at one point and none below the lamp. The use of this special glassware to tone down the light, and of a yellow-white mantle I think are the most important features. There are a great many small details which it will be unnecessary to mention, but I think those two points are the most important—the mantle and the glassware used. Of course, the lamp used is a very important consideration. Various methods of supporting the mantle are used, the central support being most largely adopted. The side hook support, which is comparatively new on arc lamps, is I think preferable. That is, to get the best effect from the incandescent mantle the mantle should be hung over the center of the burner. If it leans ever so little that side of the mantle which is leaning out of the plane will not be illuminated. That side of the mantle which is the most brightly incandesced will wear the soonest, will shrink the first. So to get the best lighting effect from a burner a mantle must hang absolutely over the center, not only for lighting effect but for the physical life of the mantle.

The Vice-President—Is Mr. Slade, of Hartford, here.

Mr. Slade—I do not know exactly what I can add to what has been said. I got along very nicely with Mr. Addicks' paper until the Secretary got down to the figures; then I got a little "balled."

The Secretary—You are not the only one.

Mr. Slade—The gas arc lamp of course we are considering from a view point of competition of the electric arc lamp. I think, that being the case, we should not devote so very much attention to having our maintenance and receipts agree. I think we should be willing to make loss in order to get consumers for our gas. We should of course charge a maintenance in order to make the consumer have an interest in the lamp, so as not to have it hang without being used, which thought is in line with the point that Mr. Nettleton raised. I think a rental charge causes the consumer to have an interest in it. The electric lighting companies furnish lamps and maintain them without charge, and I think we should come as close to that plan as we can in order to be on like footing with them. We make weekly inspections, and endeavor to keep our lamps up to the top-notch of efficiency. Our men take care of about 60 lamps per day. I did not come prepared to give exact figures on the rentals; costs I would not attempt to give. We have quite a number of lamps in service, and we have been successful with them. I think we should handle one lamp only. My belief is that it is very desirable to have only one kind.

Col. Richardson—What charge do you make for maintenance?

Mr. Slade—Forty cents per lamp per month, but that does not cover the cost. We use a good mantle, and also use the alabaster globe.

Col. Richardson—Does that include the cost and putting on of the mantle and all other parts of the lamp, and keeping it clean?

Mr. Slade—The 40 cents per arc includes labor, taking care of mantle and cleaning glassware. We make no charge for the lamp or for its installation.

Col. Richardson—The charge includes the mantle itself?

Mr. Slade—Yes, sir; every item of expense up to cleaning it and keeping it in shape. The lamps are taken down once in a while and put on a "bucker" to be "bucked up."

The Secretary—In connection with the subject of gas mantles and gas mantle lamps I would like to have an expression of opinion about the practicability of the long mantles. In the section of the town where I work there have recently been quite a number of single lamps with long mantles put on, some of them apparently pretty good lamps, and as far as I can see from casual observation the mantles seem to be standing up pretty well. I can point to quite a number of places where two of these long mantle, single lamps have been put up in place of an arc lamp, probably saving a little gas to the consumer and still giving him a pretty good light, in many cases probably all the light he can afford to pay for.

Mr. Slade—I have tested the short mantle and the long mantle, and the moment you go into the long mantle you sacrifice efficiency. I think I got results on the short mantle a little better than 20 candles per foot, while on the long mantle the results were something like 12 to 14 candles.

The Vice-President—Will another spokesman give us information on single long mantle lamps?

Mr. Erhart—We look at the general introduction of the large single unit, or the long mantle burner, as more or less of a "fad" at the present time in America. It came in very rapidly. Now the 4½-inch mantle is not as strong as the 3½-inch mantle, as the mantles are built practically the same at the heads, but have, in the case of the 4½-inch mantle, a good deal more weight hanging on the head. Therefore, by actual test, which we make at the manufactory, we find that the 4½-mantle is never physically as strong as the 3½-inch mantle. Not only that, but the shrinkage of the mantle after burning for some little time is more marked on a 4½-inch than on a 3½-inch. I mention the 4½ and 3½ as they are most generally used; 4½ is long and 3½ is known as short. Not only that, but the flame to light a 4½-inch mantle is necessarily very much longer in order to fill the mantle, and it is not nearly so hot. In testing the flame itself for its exact heat we find that the longer flame is not nearly so hot as the shorter one. On an ordinary burner the more air drawn into it the shorter the flame, and in order to elongate that flame yon throw more gas in and do not draw in the same proportion of air. That is just as true on a single burner as it is on an arc light, and is truer where there is no artificial means of inducing a draft, such as a stack or a chimney. So that from the manufacturing standpoint it is not highly to be recommended, but from the practical standpoint or consumer's standpoint it is to be deprecated, because the 4½-inch mantle, as Mr. Slade said, will never give as great an efficiency as the 3½-inch mantle on no matter what apparatus it is used. To be used most successfully, however, a 4½-inch mantle has to have some artificial means for inducing air, and something in the way of a chimney. A 4½-inch mantle standing alone on a burner will give very poor results. It is almost impossible, unless you have a very high gas pressure, to properly light the heads of the mantles. This was also the experience in Europe about 3 or 4 years ago. They were using a good many long mantles in Europe and also mantles of large diameter, but there are very few used to-day. While we don't necessarily look to Europe for any pointers in the lighting line, that a good many of them come from there cannot be denied. The same may be said of the small burner and the air-hole glassware. It is impossible to say whether that has come to stay or not. I would not attempt to prophesy in that direction. However, in Europe the use of she air-hole glassware on burners I understand is "on the wing," for we never can get the efficiency from an air-hole chimney that we can from a straight, brass jet; it is impossible. I suppose a great many of the members here have tested the results on the photometer, and they never get the efficiency from the air-hole chimney; but I would say, as far as long or short mantle is concerned, the short mantle is the most desirable for you to use.

The Vice-President—Can you give us the consumption in candle power of those single lamp, long mantle burners?

Mr. Erhart—The consumption of a 4½-inch mantle, as compared with a 3½-inch mantle on the same burner, would be about 30 per cent. greater gas consumption, with from 20 to 25 per cent. increase in candle power, but it varies so at different times and on different gases that that is only a very general statement. I mean to say that the efficiency is less. There is a greater increase in gas than there is in candle power; that is, it is not so efficient. Roughly stating, 30 per cent. is about the increase in gas.

The Vice-President—Mr. Nute, will you give us any information on the general subject of gas arc lamps, the cost of maintenance, etc.?

Mr. Nute—We have a great many in use, but having sold them all outright we do not maintain them. There are a few places where I would like very much to do so, but our people seem to prefer to have charge themselves and are not willing to pay even 25 cents a month to have the lamps well taken care of.

The Vice-President—While on this subject, I would like to ask Mr. George G. Ramsdell what success the inverted incandescent gas lamp is meeting with in this country?

Mr. Ramsdell—Mr. Chairman, I don't know that I can say very much which would have marked bearing whatever on the present subject. I might say in a general way, as far as the inverted incandescent gas lamp is concerned, we found that shortening the mantle gave us a higher candle power. The first lamps sent over here were not exactly suited to the large variation in gases that we have in this country. Of course, we all know that abroad about nine-tenths of the gas—possibly not quite so large a fraction, but nearly so—is coal gas, and the small percentage is water gas, while the conditions differ greatly in this country. We, therefore, had to change the lamp to suit the difference in specific gravity. We also found that while we could fill the longer mantle we could not get the efficiency out of the long mantle that we could with the shorter one, and that point was also changed; so all the mantles now used are what we call the short mantle. We still use some of the longer mantles in the natural gas regions where they have very high pressure, and have no trouble in filling any length of mantle. The lamp itself has finally reached a state where we think it is going in satisfactory condition. We have spent a good deal of time in distributing samples throughout the country, which as a business was not very remunerative, but the sale is rapidly growing at the present time. We are selling all over the country, and from our reports we find that the lamps are giving excellent satisfaction. We have no trouble whatever in the majority of the communities. Now and then we strike some community where the variation in pressure is so great that there is some trouble, but in those cases the lamp simply has to be adjusted in a little different way. We ourselves think you know that the inverted light when properly hung is superior to the gas arc, and naturally advocate it in that way; but we do admit at once that it is not the same valuable feature to the gas company as the gas arc, because consumption is proportionately very much less.

The Vice-President—We have a few minutes more before adjournment. I understand the Committee on Nomination of Officers is ready to report.

Report of Committee on Nomination of Officers.

Mr. Lamson—Mr. Chairman, as Chairman of the Committee on Nomination of Officers for the ensuing year, I report that the Committee having considered the matter will report these names:

For President.—F. S. Richardson, North Adams, Mass.

For Vice-Presidents.—William McGregor, Pawtucket, R. I.; Wm. G. Africa, Manchester, N. H.

For Directors.—Joseph E. Nute, Thos. H. Hintze, Wm. H. Snow, Benjamin J. Allen, D. D. Barnum.

For Secretary and Treasurer.—N. W. Gifford, East Boston, Mass.

Election of Officers.

The Vice-President—You have heard the report of the committee. What action will you take?

On motion the Secretary was instructed to cast the ballot of the Association for the gentleman named by the Committee.

The Secretary subsequently announced that the instruction had been carried out, and the Vice-President declared the result.

The Colonel's Response.

Col. Richardson—Gentlemen of the Association, I am keenly conscious of the compliment implied in this re-election to office. I, however, appointed a committee, the Chairman of which I told that this action should not be taken. I told him honestly that he should make the promotion of the First Vice-President this year. To say that I regret it would be simply telling an untruth, because it is a compliment, not only that but an honor, to be President of this Association. As long as it has been made in this way, and the vote has been taken, I will accept and express the appreciation of my re-election. I thank you, gentlemen, very heartily.

The Vice-President—The Secretary has some announcements to make before adjournment.

The Secretary—An item not on the programme is scheduled for this afternoon, which I think will be of interest to all of you. It is a demonstration of the methods to apply to a person overcome by gas. It was presented to the "Guild" the other day, and at my earnest solicitations the author consented to repeat it for the benefit of this larger meeting. It probably will occur in the latter part of the afternoon. It has also been suggested that the respective papers by Mr. Walker, Mr. Barnum, and that by Mr. Carpenter be taken up for the afternoon session. I tell you this that knowing what is coming, you may be sure to be here on time.

A recess until 2.30 P.M. was ordered.

First Day, Afternoon Session.

The Vice-President—The first business in order is the reading of the paper by Mr. W. L. Walker, of Fitchburg, Mass., on

SOME PRACTICAL RECORD SHEETS.

[For the text of Mr. Walker's paper, see Journal, Feb. 27, 1905, p. 322.]

Discussion.

The Vice-President—Mr. Walker has demonstrated that it pays to keep systematic accounts. If any member would like to question him about his methods or practice he will be pleased to answer. Mr. Snow, can you give us information on this subject relating to the way a municipal plant keeps its accounts and records?

Mr. Snow—I fear I cannot give any information. At the time of the taking over of the plants by the city a card system was inaugurated, calculated to keep track of pretty much everything we did. Unfortunately we have been unable to live up to our aspirations, in that we have had more work than we have had folks to handle it. The use, though, of card records goes without saying. Anybody who has had anything to do with the plan recognizes its worth at once.

The Vice-President—Mr. Walker will no doubt be pleased to supply any of the members with blank forms of cards or reports, so if anyone desires them he can write to him.

The President, on resuming the Chair, introduced Mr. D. D. Barnum, of Worcester, Mass., who read the following paper on

CONCENTRATING AMMONIACAL LIQUOR.

The principal source of nitrogen is coal, and most of the compounds of this element are made from gas liquor. The Department of Agriculture, United States Government, has recently perfected a scheme by which nitrogen is absorbed from the air and transferred to the earth by means of certain plants, roots, etc; so that, planting seeds prepared in a certain way, the earth will be enriched with the nitrogen taken from the air, and the soil will be in condition the following season to plant seeds which bring a rich harvest, such, as wheat. This does away with an expensive earth enricher. It is a very simple and inexpensive method, and has proved effective.

Gas coal contains from ½ to 2 per cent. of nitrogen, and will average about 1 per cent. When the coal is heated in a retort the nitrogen unites with the hydrogen to make ammonia gas, slowly under a low heat, and quickly to a greater extent under a medium heat; but the gas is disassociated at 900°, consequently too high a heat reduces the make of ammonia. Under ordinary conditions of working, from 15 to 25 per cent. of the nitrogen in the coal goes to ammonia; 50 per cent. goes into the coke, the remainder goes to the tar and into the gas as nitrogen. Under further chemical action the various salts are formed. These salts are absorbed by the water vapor in the gas, and when, condensed we have the "gas liquor."

Two classes of salts are formed, the volatile and the fixed. The ammonia in the volatile salts is driven off by simply heating. In the case of the fixed salts, lime or caustic potash must be mixed with the solution in order to distill off the ammonia. The principal volatile salts are: Ammonium carbonate, sulphide with some hydrosulphide, cyanide and acetate. The fixed salts are: Ammonium sulphate, sulphite and some thiosulphate, thiocarbonate, chloride, sulphocyanide and ferrocyanide. The salts found in the largest proportion are the carbonates and sulphides, these being formed by the ammonia uniting with the carbonic acid and sulphuretted hydrogen.

Water at 60° absorbs over 700 times its volume of ammonia; consequently more fixed salts are found in the liquor from the hydraulic

mains than further along in the process of condensing, simply because, the liquor being hot, the volatile salts give up their ammonia, and it is carried along until the condensed vapors are cool enough to absorb it, or until the gas is washed with fresh cold water, the fixed salts remaining in solution at a comparatively high temperature. A sample of liquor condensed out at 110° tested as follows: 1.21 per cent., or 4.84 ounces, 68 per cent. of the ammonia being fixed.

In our works the coal and water gases are mixed at the inlet of the exhausters, and go forward together from this point. The liquor condensed out of the combined gases at 80° tested as follows: Total ammonia, 1.45 per cent., or 5.80 ounces, 32 per cent. of which was fixed.

The mixed gases pass through two sets of washer-scrubbers, arranged in series of two each. In the first set we use comparatively weak liquor, and the strength of the liquor obtained varies on account of the different strength liquors introduced. In the second series we used fresh water. A sample tested gave: Total ammonia, 2.77 per cent., 11.08 ounces, 33 per cent. of which was fixed.

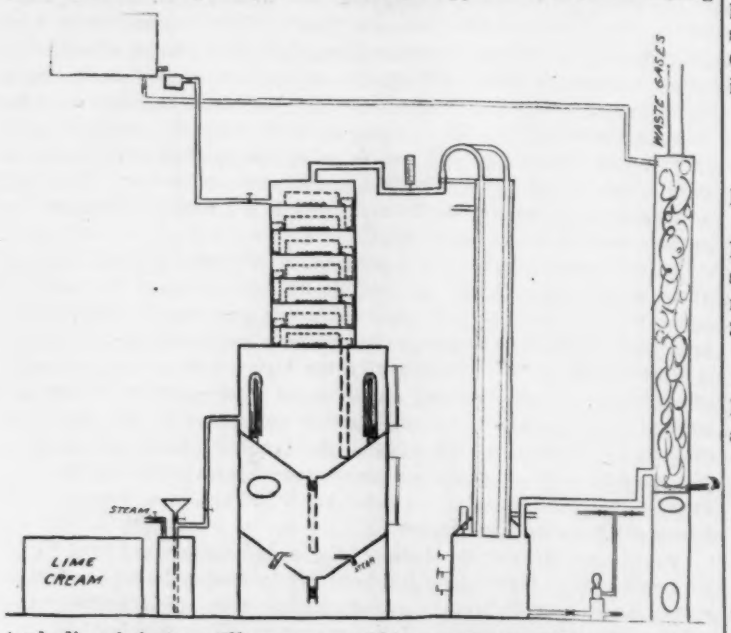
The amount of liquor obtained can be checked up somewhat as follows: First, the amount of liquor from the hydraulic mains due to the water in the coal measured 6.66 gallons per ton of coal, or 5.44 pounds per 1,000 cubic feet; second, a certain amount of hot water is run into the mains each day—this averages 3.3 pounds per 1,000 cubic feet; third, the temperature of the gas as it leaves the mains is 140°; it is gradually cooled to 75° in the second series of scrubbers. There is, therefore, about 7.25 pounds of water per 1,000 cubic feet condensed out between these two points; fourth, we add 1 pound of water in the scrubbers for every 1,000 feet of coal gas.

These 4 items make a total of 17.24 pounds of water that should contain the ammonia of 1,000 feet of coal gas. Our average make per ton of coal is 11,000 cubic feet, and the amount of ammonia obtained from one ton of coal is 80 ounces; therefore, the 17.24 pounds of water should contain $\frac{1}{11}$ of 80 ounces, or 7.37 ounces of ammonia, and one gallon of our average liquor should have 3.5 ounces of ammonia in it; this would give the liquor a strength of 10 ounces.

(The water gas enters the system at a final temperature so near 75° that its effect on the amount of condensed vapors can be neglected. The weak liquor entering the first scrubbers also had little or no effect upon this calculation as its temperature is also close to 75°.)

That no ammonia is obtained from the water gas is due to the fact that ammonia gas is disassociated at about 900° and it takes 1,800° to disassociate steam; consequently if the generator is hot enough to make water gas it is hot enough to break up the ammonia gas.

The concentrating apparatus which we installed last spring has a capacity of about 6,000 gallons of weak liquor per 24 hours. The drawing shows the principal features of the apparatus; the lime mixing



tank, lime injector, still proper, scrubbing sections, condenser, receiver, catch scrubber and pumps. While the still is working we keep a man in attendance, and it is run continuously until the stock of weak liquor is worked up. It is then shut down until the liquor accumulates again. The apparatus admits of nice adjustment and, with ordinary care, gives no particular trouble. The main precautions are: To have no tar in the weak liquor, to make a nice, thoroughly mixed cream of lime—to keep the temperature at the inlet of the condensers within 10° of the mark it is found best to work at, to have plenty of water for condensing, and to keep the outlet temperature of the condenser within 10° of its prescribed mark.

For this test we had available 6,100 gallons of 2.5 per cent., or 10-ounce liquor, 40 per cent. of which was fixed ammonia. In making this test we used 293 pounds of lime, which made 143 gallons of the cream of lime; about 9 to 10 gallons being used per charge of 400 gallons weak liquor, which is 1 pound of lime for 4.30 pounds of ammonia obtained. We used 13,056 pounds of steam, which is 10.39 pounds of steam per pound of ammonia. The steam is admitted to the still at a pressure of 20 pounds per square inch. The labor amounted to 34 hours, or 36.94 pounds of ammonia per hour of labor. From the 6,100 gallons of weak, or 10-ounce liquor, we obtained 856 gallons of concentrated, 15.29 per cent., or 61.16-ounce liquor, which amounts to 1,256 pounds of ammonia.

The following is an analysis of a sample of our concentrated liquor—this sample was taken at another time than which the above test was made:

Content.	Per Cent.
Ammonia, NH_3	12.94
Sulphur, S	0.87
Carbonic acid, CO_2	18.92
This would correspond to:	
Ammonia sulphide $(NH_4)_2S$	1.85
Neutral ammonium carbonate $(NH_4)_2CO_3$	26.27
Acid ammonium carbonate $(NH_4)HCO_3$	12.36
Ammonium hydrate $(NH_4)OH$	None.

An analysis of a sample of concentrated liquor obtained from a straight coal gas works gave the following:

Content.	Per Cent.
Ammonia, NH_3	15.79
Sulphur, S	4.11
Carbonic acid, CO_2	13.38
This would correspond to:	
Ammonium sulphide $(NH_4)_2S$	8.73
Neutral ammonium carbonate $(NH_4)HCO_3$	29.20
Acid ammonium carbonate $(NH_4)HCO_3$	None.
Ammonium hydrate $(NH_4)OH$	2.22

The character of the Worcester liquor is very unusual, due to the scrubbing of the mixed gases. The sulphur is almost completely driven out of the liquor by the large excess of carbonic acid, forming not only neutral carbonate of ammonia but acid carbonate as well. The liquor from the straight coal gas works does not contain any acid carbonate, but does contain a little ammonium hydrate.

Discussion.

The President—Gentlemen, you have listened to a very instructive paper, that gives a very complete description of what must be a very satisfactory apparatus. In this connection there are some queries in the Question Box that might apply directly to the discussion and fit in with it following this paper. The first is:

> "What is the yield of ammoniacal liquor in ounce-gallons per gross ton of coal?"

What do you say, Captain McKay? What is the yield of ammoniacal liquor in ounce-gallons?

Mr. McKay—Inasmuch as the gentleman is not here I can quote him. Mr. Fowler gave me as a standard at one time 240 ounce-gallons, and I see no reason to deviate from that standard particularly, although I notic in one instance that came to my knowledge there was a yield of 352 ounce-gallons.

The President—That was in Massachusetts?

Mr. McKay—And that was in a coal with 1.3 per cent. of nitrogen. I don't understand how it came there. I would like to hear what actually occurs in other places.

The President—Mr. Nute, what is your experience?

Mr. Nute—We don't make any coal gas, Mr. President.

The President—Another question is:

> "What is the average strength and quantity of ammoniacal liquor per gross ton of coal collected at each of the several condensers and scrubbers in the cooling and washing system?"

What do you say, Mr. Barnum?

Mr. Barnum—With 1 per cent. of nitrogen in the coal, to get 5 pounds of ammonia per ton of 2,240 pounds, .18 of 1 per cent. of that nitrogen must go to make ammonia. That can be increased by adding steam, or by putting lime in the retort, but that is not a practical way of increasing the ammonia. The amount of .18 of 1 per cent. obtained in the ammonia is limited by the temperature in the retort. A low temperature is necessary. If you obtain the temperature of 900° any ammonia that is made is disassociated. Now, it is probably an undoubted fact

that two-thirds of the retort is heated to a temperature above that at which you can make ammonia, so it leaves the front part of the retort as the only place where ammonia can be made and not be disassociated by passing through part of the retort which is at a higher temperature than it can stand. So that, with the temperatures of the retorts being run as they are in most places to-day, it would seem that about 5 pounds was all that could be gotten out of the amount of ammonia. The amount per piece of apparatus depends, of course, on the difference of temperature between the inlet and outlet, or how much of the vapor is condensed out per pound by temperature, and the strength of that depends upon the saturation of the gas and the vapors by the water.

Mr. McKay—Mr. President, if I read the figures correctly in Mr. Barnum's paper, the item in which he says that 17.24 pounds of water contain the ammonia from 1,000 feet of gas, deducting the pound of water run in, would leave 16.24 pounds per 1,000. Eleven times that for the total water thrown down from the coal gas, as water from the coal itself?

Mr. Barnum—No; I thank you. The first item is from the water in the coal as it is put in the retort, which would correspond to between 2 and 2½ per cent. of moisture in the coal. That is, the 5.44 pounds per 1,000 feet, the first item.

Mr. McKay—Where does the rest of the water come from?

Mr. Barnum—A certain amount of water is put into the hydraulic mains to take care of the thick tar that will accumulate in the hydraulic main.

Mr. McKay—And what does that make the average amount of water and the strength of the ammoniacal liquor per ton?

Mr. Barnum—The average strength is 10-ounce, and the average amount would be 2 gallons for a ton of coal.

Mr. McKay—Two gallons of 10-ounce liquor?

Mr. Barnum—The average strength would be 10-ounce. That would be 17 pounds for 1,000 feet of coal gas, and 17 pounds is about 2 gallons.

The President—Mr. Barnum, if you say that the average yield per ton of coal is 11,000 cubic feet, how many gallons of oil do you use per ton of coal? That cannot be from the coal alone; can it?

Mr. Barnum—Yes; from the coal alone; 5 feet to the pound.

The President—Oh, the gross ton! Is there any serious objection to your telling the Association about what the expense of that apparatus would be?

Mr. Barnum—I have not the figures here.

The Secretary—I would like to ask a question. I notice one case gives fixed ammonia I believe at about 40 per cent. Is that an ordinary figure or a high one?

Mr. Barnum—That is higher than we ordinarily get. You see, in collecting the liquor from the different parts of the works you will sometimes get more from the drips toward the retort house than you will up by the condensing house, and when you get more of that of course you have a higher percentage of fixed ammonia in the liquor to be worked up.

Mr. McKay—Mr. Barnum spoke of the ordinary retort yielding ammonia from ⅓ of its length. If there are any members present who have through retorts of exceptional length, 16 or 20 feet, with the gas taken off at one end only, it would be perhaps a point to learn what their yield of ammonia has fallen to.

The President—Are there any members present who have that type of setting? If so, will they give their idea? The inquiry of Mr. McKay is very pertinent, What does Mr. Prichard have to say, if anything?

Mr. Prichard—I could not tell you off-hand what the production is. My impression is that it has decreased. I have started a number of times to look up the figures, and have always given it up. I should say off-hand that it had decreased somewhat, but I could not say how much; I don't think it is a very large amount, though.

Mr. Gould—While not within the scope of the paper, I would like to ask what mechanical adjustment there is for regulating the fresh water supply to 1 pound per 1,000 feet. We have a great deal of trouble in that apparatus.

Mr. Barnum—We have a small branch cock on the end of a ¾-inch water pipe, which opened wide gives just about the amount required. The man in attendance watches it, being in the room all the time, and having been there for years he knows how to regulate it to a nicety. The maximum amount that the branch cock will give is about the amount required for the maximum make.

Mr. McKay—Mr. President, will New Bedford give us some figures on this?

The President—Perhaps Mr. Gifford might be able to.

Mr. Gifford—I have not any figures that are of really any value. I can tell you what we have done.

The President—I think that would be of value.

Mr. Gifford—I don't know whether the work and results are what we should have done and obtained, because our still has been running about 5 months, and the first 4 months of that time I think we were not taking the liquor from the tar main. For the last month of the five I have figures for running the liquor from the tar main through the hydraulic main, and the overflow went back from the scrubber. For the 5 months we carbonized 5,021 tons of coal and made 4,852 gallons of 16-ounce liquor. That equalled 8 gallons of 16-ounce liquor per ton of coal for the 5 months. During the month of December, after we were taking the liquor from the tar well, when perhaps some of the liquor had been accumulating for a greater length of time, we carbonized 1,296 tons of coal and made 16,031 gallons of 16-ounce liquor, or 13 gallons of 16-ounce per ton of coal. Those were gross tons.

The President—With the same apparatus?

Mr. Gifford—Yes, sir.

Mr. McKay—What is the last figure, Mr. Gifford?

Mr. Gifford—Thirteen gallons of 16-ounce liquor; that is, approximately 16 ounce liquor. Those were English gallons.

The President—Perhaps Mr. Carpenter can give some information.

Mr. Carpenter—I have no figures in this connection, but it has occurred to me that Mr. Barnum's idea about only a portion of the length of the retort giving ammonia may be wrong. When a fresh charge is put into the retort, undoubtedly a good deal of gas passes off before the temperature of the gas in any part of that retort will get above 900°.

Mr. McKay—Mr. President, in seeking to digest the large number of careful statements made with accuracy in this paper, there is one item of steam—10.39 pounds of steam per pound of ammonia—concerning which it would be interesting if Mr. Barnum would tell us what that average represented in the way of limits; how high it would run and how low the lowest was that he could operate?

Mr. Barnum—The total of 10.39 pounds of steam per pound of ammonia is between 12 and 15-horse power. Now, as to the way that is regulated on the machine: There are 2 valves with 2 pressure gauges, and if we know that the steam pressure is not going to fall below 80 pounds we set the first valve at 80 pounds. Then we have the pressure beyond the first valve at 80 pounds most of the time. After the first valve comes the second gauge, and then on the pipe after the second gauge comes the second cock, and if you set that so there would be 20 pounds, you would get this same pressure through all the run. That is the way we ran it, keeping 20 pounds, as near as we could, from one charge to the other.

Mr. McKay—And in what way was the measure made by which they knew they used 13,056 pounds of steam?

Mr. Barnum—To make that we set the two valves and the two gauges just the way that we run it for the length of the test, and then ran it for an hour (three different tests) and took the average. They came very close together. Does that answer the question?

Mr. McKay—I don't quite understand yet. Did you measure? Did you make a test to see?

Mr. Barnum—And then condensed the steam, of course, in a valve of water, and took the amount of condensed water. But I was explaining how we knew that a certain amount of steam went through during the test.

Mr. McKay—Making the resistance the same?

Mr. Barnum—Yes; and measuring the amount of water.

Mr. Woodward—Those are steam regulating valves, are they not?

Mr. Barnum—No; ordinary globe valves.

At this point the discussion was declared closed.

[To be Continued.]

ABSTRACT OF PROCEEDINGS, FOURTH ANNUAL MEETING, WISCONSIN GAS ASSOCIATION.

HELD IN THE HOTEL PFISTER, MILWAUKEE, WIS., FEB. 15 AND 16, 1905.

FIRST DAY, MORNING SESSION.

The Association was called to order, at 10:15 A.M., Feb. 15, by the President (Mr. E. G. Pratt, of Milwaukee), who said:

Gentlemen—In convening you in fourth annual session, I regret the attendance at this opening session is so small, but that I presume can be easily accounted for by reason of the extreme cold weather and the lateness of all the trains. The replies that Secretary Hyde received were very flattering for a large attendance, and I presume that the delegates will be here later on; at any rate we hope so. We anticipate

a very enjoyable meeting, especially if we have the number to help participate in making it a large meeting. We congratulate those who are here from out of the city, and say to them that we shall endeavor to make their time as pleasant as possible while they are here.

ROUTINE BUSINESS.

Roll call was deferred and the reading of the minutes of the last meeting was dispensed with.

The Secretary read the following

REPORT FROM THE EXECUTIVE COMMITTEE:

To the Members of the Wisconsin Gas Association: Your Executive Committee begs to recommend to membership the following gentlemen:

Active.

Adler, H., Milwaukee, Wis.
Douglas, D., Eau Claire, Wis.
Eaton, A. B., Sheboygan, Wis.
Kelsey, F. J., Milwaukee, Wis.
Knight, J. J., Kalamazoo, Mich.
Lewis, W. A., Milwaukee, Wis.
Morris, W. C., Ashland, Wis.
Utley, P. L., Watertown, Wis.
Williams, Geo., Madison, Wis.

Associate.

Collins, W., Stamford, Conn.
Jones, D. A., Appleton, Wis.
Osborn, H. H., Chicago, Ills.
Plantinga, P., Cleveland, O.

The following committees for the coming year are recommended:

Legislation.—C. H. Williams, Chairman; Julius Lindstedt, Edgar P. Sawyer.

Wrinkle Department.—H. M. Buck, Chairman; W. A. Leuenberger, Jas. H. Walker.

Question Box.—Ewald Haase, Chairman; R. P. Kraft, I. F. Wortendyke.

Committee on New Business.—R. N. Kimball, Chairman; F. J. Rutledge, Wm. Wallen.

Committee on Place of Next Meeting.—E. Daniell, Chairman; A. G. Lloyd, David Douglas.

Committee on Nominations.—J. L. Hendley, Chairman; W. B. Johnson, Alfred G. Lloyd.

The following papers have been prepared for presentation at this convention:

"A Brief Outline of Gas Works Chemistry; Part II.;" by Dr. H. B. Harrop.

"Fuel Economies," by Mr. B. C. Adams.

"Distribution Picking," by Mr. Bryce McAdam.

"Promoting New Business," by Mr. George Williams.

"Some Commercial Problems of a Gas Business," by Mr. David Douglas.

E. G. PRATT,
B. O. VILES,
HENRY H. HYDE,
} Committee.

On motion the report was accepted.

Mr. Haase—Noticing that the President is about to read his address and being familiar with its contents, having read it, I would like to suggest to the members to postpone the reading thereof until such time as there shall be a more representative attendance than the present one. I think the merits of the address will warrant its being heard by the largest possible number of members of the Wisconsin Gas Association. [On motion the suggestion was adopted.]

The President—If it meets with your approval we will call on Mr. David Douglas, of Eau Claire, to read his paper. Gentlemen, I want to introduce to the members Mr. Douglas, who although one of the older gas men of the country, and a gentleman whom I have known for a great many years, is nevertheless the youngest member of this Association. I take great pleasure in presenting him to you.

Mr. Douglas—Mr. President and Gentlemen, I feel it is almost necessary to apologize to this Association for being so dilatory in becoming a member, after being so long identified with the gas business generally, and also in Wisconsin. I have no doubt some of you, including Mr. Hyde, wondered why I held back so long, but the fact of the matter is I had practically given up attending Association meetings altogether, feeling that I was a pretty old chap for such visiting, and I feel also that apologies are due that I should come before you with any kind of a paper at all. However, I had to write something, because President Pratt and Secretary Hyde insisted, so I have put together the following thoughts on

SOME COMMERCIAL PROBLEMS OF A GAS BUSINESS:

It has always appeared to me that the gas business is more prolific of problems for discussion than any other business in the world. I have been attending gas association meetings for about 30 years, listening to discussions, and have also been reading reports of the proceedings of foreign associations and thousands of articles prepared by the most scientific men in the world, all bearing more or less on the gas business, and yet I don't begin to know it all; and wherever we meet a bunch of gas men we will surely find them discussing some unsolved problem of the business. In all probability the questions discussed are not new ones, and most of them have been partially answered, but there never appears to be any final answer to any question in the gas business. There is always something to be added, something capable of improvement in every direction; nothing is finally solved. And what a range of subjects we have to cover. Engineering design and construction, and all the details of mains, services and meters, the chemistry of coal and all its products, the infinite questions relating to the operation of gas works, the proper methods of keeping accounts and the successful treatment of consumers, so as to get the most money out of them with the minimum of kicking; and all of these questions finally lead us to the principal question of interest to the stockholders of every company and to all gas men, "How shall we manage our business so as to make the most profit out of it?"

Nearly 100 years ago, when the gas companies were first organized in England, they generally selected the title of "Gas Light and Coke Company," and the name indicated the nature of the business they intended to pursue. They proposed to manufacture and sell gas for light and coke. At that time there was no thought of fuel gas. We find a change of thought in later years, when companies in organizing selected the simpler title of "Gas Company" or "Gas Light Company," leaving out the word "Coke." We see in this change of name the intention to say that the manufacture and sale of gas named the business intended to be pursued, and that if any coke were made it would be as a residual or by-product.

The question which I desire especially to bring before this meeting for discussion is whether the commercial conditions now existing are not driving us back to the original attitude of gas companies, and that we ought to look upon the coke manufactured by us as a primary product, not merely as a residual.

During the past few years we have seen the organization of companies to make coke as their only primary product, and they in turn have classed the gas as a residual or by-product. I am not referring to coke companies operating in the coke districts and producing chiefly hard coke for smelting purposes, but to such companies as have started plants in this city of Milwaukee and in Duluth, with the avowed intention of manufacturing coke for domestic purposes and of disposing of the gas at any price it may bring in the market, or blow it away to get rid of the surplus. Surely that is turning the tables on us with a vengeance.

It is not my intention to discuss whether such coke companies can operate with profit or not, but the basic thought of their business is that the coke made from a ton of coal is worth more commercially than the coal it is made from, and I am of the opinion they are correct in that view.

It will be borne in mind that we are a Wisconsin Association, and I am speaking as a Wisconsin man and with reference to Wisconsin conditions and prices. Eau Claire may be fairly typical of many cities in this State, and here we find the cost price of a ton of anthracite more than twice that of a fairly good bituminous coal, and the retail delivered price of anthracite just about double that of bituminous coal. If anthracite is worth $9.50 per ton and bituminous coal worth $4.75 per ton delivered, what ought to be the price of gas coke? I think I hear someone say, "The price for gas coke will be just what you can get for it;" and he is right; but that does not answer the question, "What ought we get?" Coke must have some relative value in the market as compared with anthracite and other fuels, and it is our business to ascertain what that value is, and then do all in our power to get the price our product is entitled to.

My impression is that the question may be simplified by comparing the relative merits of coke and anthracite. They are about equal in calorific power and both are smokeless. Anthracite is twice as heavy as coke and requires less space to store it. A fire fed with the same bulk of anthracite as of coke will last twice as long as a coke fire, and, therefore, requires less attention. Coke will, however, burn with less draught, it is easier kindled, a hotter fire can be obtained with it in less time than with anthracite, and the fire can be regulated easily to any required temperature by simple manipulations. Coke is in every respect the equal of anthracite except in the one qualification of weight. Surely if we should make an allowance of 20 per cent. difference in value in favor of anthracite it should be ample. If, therefore, anthracite is worth $9.50 per ton, coke should be worth $7.50 per ton, and it is my business to get that price if I can, and not be content to dispose of it

at any price I can get for it, as a residual which must be disposed of.

In Eau Claire, in the year 1901, we built a coal gas plant; prior to that we had been making water gas and buying coke instead of having coke for sale. As no coke had been on the market in Eau Claire for many years, there was no demand for it, the majority of the people did not know what gas coke was, and it was up to us to educate them and make a market for what we then called our most important residual. We had to sell it at some price, even if we had to take less than the price of bituminous coal for it. I will not weary you with the details of hunting for customers, but we did hunt, not only in the city of Eau Claire, but also Chippewa Falls and all the neighboring cities, and by hard work managed to dispose of it at very low prices. The coal strike of 1902 helped us out that year, but we were one of the few companies who had coke left for shipment by rail to other cities. In 1903 we took the precaution of selling a considerable quantity of our coke under contract to large consumers, with the result that we ran short of stock in February and March and had to turn away orders from people who were beginning to appreciate its merits. In the fall of 1904 we determined that it would be good policy to arrange to build up the demand for coke in the city, without regard to our own limited production. We would sell all the coke we could and if we should run short in our own we would buy from other cities to supply our local market. We reasoned that by that policy we would be sure of getting the market price for the coke we ourselves made, and we could not expect at any time to do better than that. We spent some money in advertising and canvassing, and already we have purchased about 300 tons of coke ourselves and sent at least one coal merchant into the coke business besides. Our canvassers say that they can sell, next season, 1,000 tons of coke more than we will make, so we are sure of the market price for our own coke; but strange to say, we are not going to be content with that; we are not satisfied with selling our own coke at the price at which coke can be purchased at other cities (where it is looked upon as a residual) plus the freight and other charges. We think coke is worth more as a fuel relatively than it is being sold for, and with concerted action on the part of all the gas and coke companies of the State to educate fuel users to the true value of our goods, we think we will be able to obtain higher prices for our coke in a natural and legitimate manner.

Our methods of working up the demand are manifold. Newspaper advertisements do a lot of good. They attract attention and awaken inquiry, but we depend most upon personal canvass to obtain the business. When we hear of any building from which complaints are made that they are insufficiently heated, they are our sure meat. When soft coal and hard wood and anthracite all have failed to heat a building, we find we can do it successfully with coke, and at a saving of expense. The first question which every new consumer asks is, "Can I use it in my particular fire or furnace at all?" We inform him that we have a man skilled in furnace work and in the use of coke and we will send him to make an investigation and report upon the matter direct. As a rule there is nothing seriously wrong with the appliances, although in some instances we have recommended and made changes of grates and minor alterations with much advantage. This same expert will build the first coke fire and watch its operation, and will explain what to do, and pay as many subsequent visits as may be necessary to educate the party attending to the fires how to use coke with advantage. Janitors of buildings quickly fall in love with coke as a fuel. If they have been using soft coal, they find they no longer have the daily irksome and dirty duty of cleaning boiler flues. If they have been using wood, they have only one-half of the attention to give to the furnace, and the occupiers find they have a steady and satisfactory temperature instead of an erratic and an often insufficient one. We hear the statement made every day, "Coke is the only fuel; we will never use anything else again;" and every customer of this kind becomes a canvasser of the best sort, and as the demand for coke increases there will be a tendency towards a rise in the market value of it.

If a gas company is to look upon gas and coke as primary products, it may still have to look upon tar and ammonia as residuals. The present existing depressed condition of the tar market has been a source of much anxiety to every gas manager. Everybody is asking, what shall we do with our tar? I do not think it necessary to go into all the details of the tar market, but it must be evident to us all that the low price of tar is because the supply exceeds the demand. We must not forget that tar still has value as a fuel, when all other demands for it cease. Its value as a fuel is also relative to the cost of other fuels in the same market. If bituminous coal is worth $4 per ton, what is the value of a ton of tar? I have had very little experience in burning tar under retort benches, but some have claimed that a ton of tar is approximately equal to 1½ tons of coal, and if that be so then a ton of tar compared with coal at $4 per ton should be worth $6, and as we know that the buyer gets at least 10 pounds of tar for every gallon sold to him, we may count 200 gallons of tar to the ton, and under such conditions the tar is worth 3 cents per gallon to the gas company. I know of some managers who have been selling tar at 2 cents per gallon and even less, but surely they have been blind to their own interests I have no sympathy with the threats made by some unthinking men in the South, that they would burn enough of the cotton to produce a scarcity and so raise the price of what would be left; but to burn tar because it is profitable to do so is a good business reason, and if denuding the market in that way does ultimately stiffen the price, we shall have gained a double advantage. My advice, therefore, is to burn the tar unless you can get a higher price than it is worth to you as a fuel.

The only other product to consider is the ammonia. In gas works carbonizing less than 2,000 tons of coal per annum it is debatable whether it pays to save and concentrate the ammonia at present prices. In larger works there is a profit which I have seen estimated all the way from 15 cents to 35 cents per ton of coal carbonized. The profit seems largely to depend upon how the account is figured out. We do know, however, that to save 5 pounds of ammonia per ton of coal carbonized is a practical figure and that it is worth, in concentrated form, at Detroit, about 9 cents per pound, which is a gross income of 45 cents per ton of coal. Allowing reasonable charges for operation and maintenance of the concentration plant and freight charges on the liquor, it does seem that a net profit of 25 cents per ton of coal might be made from the ammonia.

Drawing all these points together, let us see how they come out.

First, we note that if we can work up the demand for coke to $7.50 per ton delivered, or a net price of $7 per ton in the yard, it will pay us better to use a cheaper grade of fuel under the retorts and sell all of the coke which we make. We will look upon the coke as a primary product to be sold at a profit and not as a residual or by-product. The tar will have a fuel value only and the ammonia to be sold at what we may happen to get for it.

That we are steadily on a downward scale of prices for gas cannot be doubted. In the smallest cities the agitation is for dollar gas, and in the large cities the cry is for 75 cent or even 60-cent gas; and who can stop it? Do we gas men want to stop this lowering of prices, even if we could? On the contrary, we are desirous of helping the movement along, not recklessly nor to the injury of the invested property interests entrusted to our care, but by straining in every direction towards economy in operation and by building up the business in such a way as will make these demands of the public possible of fulfillment.

When the discussion on the Douglas paper was ended and some routine business was finished an adjournment to 2:30 P.M. was ordered.

FIRST DAY—AFTERNOON SESSION.

The Association reassembled pursuant to adjournment. Mr. Viles took the Chair and President Pratt read the

ANNUAL ADDRESS

as follows:

Gentlemen: We have convened here for the fourth time in the history of this Association for the purpose of renewing old acquaintanceship and of making new friends with those who have come into our ranks since the meeting of one year ago. It is customary I know in Presidential addresses before societies like this to review the happenings of the past year and to speculate upon what the future may have in store for us, but such matters are so often brought out in the reading and discussions of papers presented that I shall refrain from going into such detail, and will confine myself to one or two subjects that I believe are of paramount interest and importance to our Association at this time.

This Association now has upon its rolls 73 active and 35 associate members, representing every gas company in the State except Baraboo, Portage and Ripon, and we should not be satisfied until a representative from each of these companies shall have been secured.

Although the youngest Gas Association in the country, and a healthy youth, yet it has not been a very vigorous one as compared with some of the other and older State Associations. The reasons for this, however, I think, can be easily explained. About 25 per cent. of the active members of this Association are employees, in one way or another, of the Milwaukee Gas Light Company; 22 per cent. are members of the American Gas Light Association; 26 per cent. are members of the Western Gas Association, and 22 per cent. of the Ohio Association. Now, members are usually called upon to either prepare papers or dis-

cussions for an Association of which the representatives of the Milwaukee Company are a part, and the meeting of which is held only a month later. Five members and employees of the Milwaukee Company are very active in the affairs of the Ohio Association, and by reason of their interest in this latter Association are prominent either as writers of papers, members of research committees or propounders of questions and expounders of same; and the meeting of the Ohio Association meets one month later; hence, when the influence of these workers is removed from our Wisconsin Association there is but a small majority left to be called upon for work, and it is little wonder that no greater consideration is given to the affairs of this Association until the time for its convening is really upon us. The Wisconsin Association should be alive to its own interests and the interests of its members. Of course, if we have energy to spare there can be no possible objection to our assisting in the work of other Associations. Possibly the good accomplished by this Association has been as great as could reasonably be expected in the few years it has existed, but I want to remind you that there is work to be performed here at home, and we can make for it a record that will enable us to keep pace with other State Associations.

This brings me to the consideration of a subject that is now receiving considerable attention on the part of the different Gas Associations, and there has recently been held in New York a meeting of the committee selected to give the matter careful and thoughtful consideration. I refer to the materialization of some plan looking to a consolidation of the different Associations of this country, or a plan by which better co-operation of the different Gas Associations may be secured. There are so many Gas Associations now working independent of each other that to belong to all would be a burden that none of us could stand, and probably that none of our companies would want to stand for us, and aside from the expense the time required in attendance upon meetings would not be permitted. It is undoubtedly the duty of every company to have its representative identify himself with his own State Association, in States where a Gas Association exists, because of the fact that his usefulness and co-operation are required, and his duty is primarily to the State Association. And because of the advantages offered by some of the larger and older Associations he is wise if he associates with one of these, selecting the one that will return to him and to his company the greatest benefits.

I do not care to anticipate the work of the committee appointed to thresh out this question, for I believe the wisdom of the gentlemen constituting this committee will formulate some plan that will be satisfactory to the greatest number; at the same time I realize they have a very difficult task before them. I hope, however, that some plan will be evolved by which there can be one National Association, and that the State Associations will be subsidiary to it. By some such plan the membership of the National Association would be largely increased and its work greatly extended, and the State Associations would in themselves be more of a factor for their own good than they are now. At the present time we have the American, the Western and the Ohio as the leading Associations, with a membership unlimited so far as locality is concerned and each working along practically the same lines, with no particular feature in either that the others do not possess, unless we except the Practical Class of the American, which has extended and afforded so much good to the young man who is seeking knowledge and information that he probably could not get in any other way or from any other source. We admit, too, that the vigorous manner in which the Ohio Association has conducted its Question Box in recent years has brought it to the front, but while such zeal is commendable, its operations have extended beyond the confines of State lines, and its influence consequently more far-reaching than probably was ever attempted by any other Association or contemplated by its founders.

Why should not the work of the three great Associations be concentrated? Why not consolidate the *dignity* and "Practical Class" of the American, the *good fellowship* and "Wrinkles" of the Western, and the *energy* and "Question Box" of the Ohio into one great National Association? I hope, for the future good of all the Associations, that this may be brought about.

Concentration of effort along certain lines on the part of gas companies and associations of gas companies is, in my judgment, necessary, for while we are discussing technical and other questions of great interest and benefit to all, there are other matters of vital importance which ought to receive more atteention and to which the State Associations should devote themselves.

A matter of great and growing importance to officers and stockholders of lighting and other public service corporations is the strong tendency toward municipal socialism. It should be borne in mind by those of us who are interested in Wisconsin that there are special dangers confronting this field. One very serious fact that has escaped its full measure of attention is that the general raising of valuations for assessment in this State operates to raise the bonding limit of every municipality. Already there are signs that the ability to increase municipal bonded indebtedness thus acquired will be a temptation to experiment in municipal lighting and other industrial enterprises. It will be well to be alert to check this tendency with sound argument.

The correct limitation of representative government is the protection of persons and property. All government is a tax upon the governed, and the more numerous the functions assumed by government the more difficult to equitably distribute the burden of cost.

The general post office, public schools and municipal water service are pointed to by socialists as examples of socialism already incorporated into our system. In strict sense this is true, but these are not industrial enterprises. They are in the nature of public service. They do not involve the risk of a manufacturing business, and are undertaken regardless of profit on the broadest grounds of public welfare.

Lighting and some other municipal works, which involve all the elements of manufacturing and selling industries, are much more hazardous investments and more likely to suffer from the looseness of public official methods, and the incompleteness, inaccuracy or total lack of public accounting.

There is much theoretical promise for municipal socialism, but facts to warrant it are totally lacking in this country, and very far from conclusive in Great Britain, where it has its strongest hold and has had its fairest trial. Even there two-thirds of the gas lighting undertakings, after 100 years of experiment in municipal gas, is in private hands, and this notwithstanding municipal gas makes a better showing than any any other industry thus far socialized.

Socialistic tendencies need jealous watching by Americans who still believe that "Eternal vigilance is the price of liberty." No political principles are more subversive of representative government. They are diametrically antagonistic to the fundamental principles of our constitution.

In Great Britain and in Massachusetts, where State regulation has its best illustration in this country, the tendency is toward perpetual franchises to private corporations for all so-called "public services" of the industrial sort, coupled with State regulation, that broadly recognizes the business risk and the right of capital to fair returns.

The present widespread agitation throughout this country of government ownership and control of industrial public services is likely to require of all men connected with private corporation interests intelligent consideration and decisive action. This is reason sufficient for referring here to this large subject. There is evidence all about that it is a very present and live political question, locally and nationally, and its gravity forewarns us to be armed to meet its seductive generalizations with facts and logic.

In further consideration of this question I am prompted to inquire, What have these disturbers of government and society ever constructed? What great industries have they ever helped develop? These are days of brains, progress and development, and so much has been accomplished in very recent years by the brains, energy and money of men and combinations of these that we are prepared for any great undertaking, and nothing surprises us.

It seems to me that public service corporations have been too reticent in the discussion of their side of the question, and the people are persuaded, because they hear and read of but one side, that that side is all there is to it—at any rate the popular chord is touched. The theory that the Socialist, if left to himself, will talk his subject to death may have some foundation, but I believe we are reasonably justified in taking issue with any movement that seeks to destroy our interests, or to jeopardize them in the minds of the people. Our business is with the people. Sometimes we feel they are unappreciative and unsympathetic, but they can be persuaded, and they are as a community honest; therefore, let us keep close to the people, discussing these matters fully and frankly, and they will come to a realizing sense finally that the wrongs which have been so vividly pictured to them cannot be righted by any sect or schism, who, by reason of their record to date, have been unable to demonstrate they have anything better to offer, or that the world has been made any better by reason of their theories and their existence.

That an attractive programme has been prepared, that the papers and discussions will be interesting and instructive is evidenced by this large attendance and your apparent desire to help make the meeting a success. I ask for a free and candid discussion of all questions brought up for consideration.

On behalf of the officers and employees of the Milwaukee Gas Light Company, I bid you welcome to this city.

The Chairman—As it is customary to refer the President's Address to a committee, I will appoint as such Messrs. Haase, Douglas and Lindstedt as the committee to consider it for future report to the Association.

(To be Continued.)

Improved Method of Making Firebrick.

On February 28, 1905, U. S. Letters Patent (No. 783,797) were granted to Mr. Sheldon Norton, of Watervliet, N. Y., for certain "New and useful improvements in making firebricks." Using the words of the specification:

The object of my invention is to cheaply produce a strong, light, and durable firebrick or the like for fireprofing purposes.

My invention in its preferred form consists in utilizing the slag of blast furnaces, ordinarily a waste product, by mixing with it when tempered and granulated an hydraulic cement, such as Portland cement, then grinding the mixture, forming it into a paste by the addition of water, molding, piling, and sprinkling it from day to day until set to the required degree of hardness, as hereinafter more fully described, and subsequently claimed.

The slag which comes from the ordinary blast furnace for treating iron ores has been subjected to a very high degree of heat sufficient to flux and remove such fluxible materials as lime, magnesia, potash and metallic oxides, leaving a fireproof material well adapted to form the principal ingredient of hollow firebricks for fireproofing buildings, and such slag when granulated and tempered by running the same into water possesses certain hydraulic properties which well adapt it to the formation by hydration of a hard and durable stonelike substance, and by the association therewith in powdered form of an ingredient capable of accelerating such hydraulic action or hydration I have ascertained that the use of such slag is rendered practicable for the manufacture of fireproofing material. This can be done by incorporating with the powdered slag a small percentage of hydraulic cement, such as Portland. The hydraulic cement has been subjected to a very high temperature during its manufacture, and the mixture remains practically fireproof. The mixture can also be transformed into hard and strong tubular bricks without the expensive burning process, it only being being necessary to pile up the green brick under a cover which will protect them from the elements and sprinkle them with water from day to day uutil they set and harden sufficiently for building purposes.

In practising this improved method the slag as it comes from the furnace is granulated by running it into water. The granulated slag is then dried and ground with a small quantity of Portland cement, which may be from 2 to 10 per cent. of the mixture, depending upon the character of fireproofing desired. The larger the per cent. of cement within the above limits the harder and stronger will the finished product become. Water is then mixed with the dry powder which results from the grinding operation to form a thick paste, which is put into the desired form by any of the well-known machines or mechanism heretofore used for like purposes. The green bricks are piled up under cover, where they are sprinkled with water from day to day until set to the required degree of hardness. They may be sprinkled once a day for three or four weeks with good effect. The claims are:

1. That improvement in the art of making fireproofing and the like, which consists in tempering, granulating and imparting hydraulicity to blast furnace slag by running the same while molten into water; reducing the tempered and granulated slag to powdered form; mixing a small percentage of hydraulic cement with such powdered slag to accelerate hydration, forming a thick paste by the addition of water to the mixture, molding the paste into desired form, and imparting to the molded article the required degree of hardness by the application of water.

2. That improvement in the art of making fireproofing and the like, which consists in drying granulated blast furnace slag, mixing therewith a small percentage of hydraulic cement, reducing the dry mixture to a powder by grinding, forming a stiff paste paste by the addition of water to the dry mixture, molding the paste into the desired forms, piling the green bricks under cover and sprinkling them from day to day with water, until they have set to the required degree of hardness.

3. Fireproofing material formed from tempered granulated and powdered blast furnace slag mixed with a small percentage of hydraulic cement and water, and hardened by the application of water, substantially as described.

The Outlook for Electrical Engineers.

By Mr. Howard S. Knowlton, in *Electrical World.*

It seems to have become very much the fashion of late among some of the engineers who have had the privilege of addressing large bodies of students in our technical schools to throw cold water in no small quantities upon the prospects of young engineers in general and electrical engineers in particular. A great deal has been said about overcrowded conditions; the systematizing of modern industry to a degree which leaves little opportunity for the inexperienced graduate to be worth even the modest $6 a week which strives to live up to itself as a salary; the concentration of epoch-making responsibilities in a few expert hands, or rather heads; the uselessness of preparing to specialize in any particular department when six to one the newly hatched graduate will find himself collecting bills, filing correspondence or counting kegs of nails and checking up the arrival of sundry cans of oil, grease, barrels of lamps, etc., where he had expected to be designing new and wondrous types of bridges, lighting circuits, dynamos and transmission lines, and finally the development of applied science to such a point that there is little chance for the exercise of even exceptional intellectual power in the way of new discoveries. If one of the speakers happens to be particularly optimistic, he will perhaps throw in that rather indigestible crumb of comfort, "There's always room at the top," and go his way with a sense of duty done in trying to sensibly check the ultra-enthusiasm of ambitious youth.

A little serious consideration of this point of view is all that is necessary to demonstrate its error. In the first place, enthusiasm is one of the most vital factors in the world's progress, and anyone who attempts to destroy it runs the risk of stifling that originality of view which is the foundation of every real advance in engineering. The hard-bought experiences of business life are usually rough enough to at least dull the edge of that fresh vitality which is perhaps the most striking characteristic of the young engineer's personality. Experience will temper enthusiasm where a wet blanket lecture will anneal it.

It is, of course, well for both students and newly developed engineers to realize what has been accomplished in the past before they attempt to improve upon the present. Probably more men are going into engineering work to-day than ever before. Whether this is due to the widespread increase in the facilities for obtaining scientific education or to the more general recognition of the function of engineering in modern civilized life, the fact remains that close competition exists and will probably grow keener rather than less severe as time goes on. It is also true that the general principles which underlie the practice of electrical engineering have become well established. The discovery of a new and important law in electrical science is a rare occurrence at the present time. Putting these facts together, it may be true that overcrowding exists among those who would devote their lives to purely technical pursuits, but with the commercial problems of 20th century engineering which are in crying need of solution staring us in the face, it is preposterous to sit down and fold our hands with the idea that nothing worth doing remains.

Theories rise and fall, and systems come and go, but the day is far distant when the keen edge of original thought based upon sound training cannot hew out a secure place for itself in the most hide-bound and red-taped corporation which ever employs new blood. Strong as the tendency of the times is toward the organization of great enterprises which may be operated by wage earners rather than by a salaried rank and file, there never is likely to be a time when the direction and analysis of the working of these great industrial forces will not require the services of trained business engineers. While it may be given to the few to originate the broad conceptions which link their names in history to the larger industrial undertakings, it is given to every subordinate to do his own detailed work so well and so ably that it shall have its part in the final success of the completed structure, and the stimulus of being identified with even a small part of an important undertaking is no mean one.

Considering the man who has specially trained himself for service in some particular field of electrical work, it is hard to see wherein the probable early experiences of his business life should debar him from such preparation. One's perspective undergoes a tremendous change after the prized diploma is framed and hung, or else, alas! stowed away in a trunk against a time of use which seldom arrives. There are those who hold that it makes little difference where the engineering graduate first gets his grip on practical affairs, so long as he gets the grip. However this may be, it is certain that a special knowledge of one field is often of great value, particularly in electrical work, which touches

every phase of civilized activity. Inasmuch as it is frequently impossible to predict the field of work which a man will follow through circumstances and choice, there would seem to be no reason why any special predilections should not be indulged. The lists of graduates published in the catalogues of engineering schools illustrate occupations ranging from engineers and managers to poets and milkmen!

Every branch of engineering has its unsolved problems to-day, and particularly does this apply to electrical work. Transatlantic telephony is still to be realized, and on land, New York and Denver remain to be connected by toll lines. Innumerable water powers the world over await the development which the presence of a market sets in motion. The storage battery has far from captured the automobile for long distance travel. The telegraph still does a duplex and quadruplex business instead of a multiplex transmission. Railway signalling is capable of being greatly improved, particularly on trolley roads. The power house bristles with differences of opinion as to apparatus and systems advisable and the sub-station stands at the threshold of great changes in design. The production of electrical energy direct from coal challenges the ablest minds of modern times. Wireless telegraphy, the electrification of steam railway suburban service and the development of certain interurban lines with alternating current motors stand as open doors of opportunity to the electrical engineer. Industrial chemistry calls for electrical assistance as never before. The freight traffic of steam railways still remains loyal to the steam locomotive and challenges the best electrical engineers of the transportation field to capture it.

Finally, the operation of all the electrical enterprises thus far developed opens a permanent field for the abilities of innumerable engineers. The growing appreciation of the business side of technical work is one of the brightest signs of the times. Opportunities for eliminating waste and misdirected labor are never wanting. If every branch of electrical science were applied to the capacity of civilization to receive its application, there would still remain the great field of operation as a promising outlook for electrical engineers.

The Electrical Mysteries of the Sun.

Electricity says we have held, since Helmholtz enunciated the fundamental law of the conservation of energy, that electricity is but the equivalent of some force, by whose transformation merely another phase of its existence is manifested.

This idea has been exploited for many years, and of late another presumption has followed closely on its heels—that electricity and matter are mutually identifiable. Interesting as these conclusions seem, wonders of a more fascinating nature pour down upon us from the sky, launched toward the earth with inconceivable speed from the sun. The sun sends us heat, but it also yields its myriads of electric corpuscles, which set the aurora blazing with ghostly gleams in the north and south and sends vast eddies of electricity around the earth with their fluctuating magnetic fields.

It is well to know that the sun's mass is 1,000,000 times greater than that of the earth; that a large orange and a small pin head separated from each other by several feet of space, are a duplicate of the astronomic proportions; that the convulsions and storms raging on this gigantic sphere find their echo in the far-off regions of all surrounding planets, in whom, as in our own little world, electric and magnetic forces are induced to action.

It is not so many years ago that a paper was read by Prof. Pupin, of Columbia University, and reinforced by experiments, in which the electrical origin of the sun's corona was demonstrated to a degree which to-day seems almost prophetic. Photographs of the natural and artificial coronæ when placed side by side seemed to have been obtained under the same conditions. It is the corona which seems to present and to contain one of the greatest of solar mysteries.

It may seem futile to spend time in speculation as to its cause or nature, but this is more than excusable in view of the inherently electrical character of this colossal phenomen. Colossal it will be admitted to be, when the fact that coronal streamers have been measured and found to exceed 250,000 miles in length. The extreme tenuity, lambent brilliancy and unrecognizable spectroscopic character have stamped this mysterious crown of the sun as an essentially non-chemical manifestation. Thus, a new field of investigation has been opened up in this direction, supported on the one hand by purely terrestrial and in all probability, secondary evidence, and on the other hand by solar exhibitions of a primary nature that seem to originate from purely electrical causes. The latest exhibition of this kind is in the way of sun spots, which are known to appear periodically every eleven years, and give rise on the earth at such times to the well known magnetic storms, auroral lights and earth currents. We have already advanced the point brought forward by Marconi, that at night he could signal further than during the day, the sunlight seeming to interfere with the waves he projected, the cause probably being not the sunlight, but the electrons striking the earth on the bright side. This might be regarded by some as an accumulation of evidence of a most convincing nature, but the unfortunate fact remains that it has not as yet been properly correlated. It is generally admitted that the 92,000,000 miles of space between earth and sun form not so much a gap, as a link; and the ether bridge is traversed by a variety of forces, among which are certain forms of waves of which we are only now becoming conscious. Mysteries they may be to-day, but we have the hope that the newer knowledge that has and is coming, will enable us to arrange these facts in such a manner that they will present another well written page in the great book of nature.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

Mr. A. W. Cook, of Susquehanna, Pa., informs us that he has secured a franchise for the erection of a works to supply gas on all accounts to the residents of the boroughs of Susquehanna and Oakland Pa. He says that he will have the plant "going" by next fall. He further remarks that he is in the market for "actual communication" with those who sell gas apparatus.

A correspondent in Wilkes-Barre, Pa., writing under date of the 2d inst. says: "A trade was closed yesterday afternoon by which the Hazleton (Pa.) Gas Light Company passes into the control of and will be consolidated with the Wyoming Valley Gas and Electric Company, the last named Company being a consolidation of the gas and electric lighting interests serving Nanticoke, Plymouth and West Side towns. The Hazleton Gas Light Company is capitalized in $125,000, and its officers are: President, E. H. Jones; Secretary and Treasurer, W. P. Billings; Superintendent, Edward Flanigan. The Company's franchise covers Hazleton, West Hazleton, and Hazle townships containing a population of about 25,000. The output of gas last year was about 12 millions cubic feet. The new owners will make extensive improvements to the plant, extend the mains of the Company over considerable new territory, and generally bettering its condition. The officers of the Wyoming Valley Gas and Electric Company are: President, C. H. Geist, of Chicago: Treasurer, C. B. Kelsey, of Grand Rapids, Mich.; General Manager, A. C. Swain.

According to Mr. William L. Clarke, whose official title is that of General Manager of the United Gas, Electric Light and Fuel Company, the "main offices" of which are in Sandy Hill, N. Y., is our authority for the statement that there is no truth in the report that the Sandy Hill, etc., properties were ever purchased by the Hudson River Power Company.

The annual meeting of the Gettysburg (Pa.) Gas Company was held on the 6th inst., and the officers elected were: President, Hon. D. P. McPherson; Secretary and Treasurer, Charles S. Duncan; Superintendent, Allen B. Plank; Managers, W. W. Hofer, Chas. S. Duncan, J. B. McPherson, S. A. Hammond, D. M. Wolf and M. E. Zinn. The reports of the outgoing officers showed that the last year was a remarkably prosperous one in the history of the Company.

A correspondent in Houston, Tex., writing under date of the 6th inst., says: "The Houston Gas Company is to be reorganized, the present local owners retaining an interest, and with them will be associated Messrs. Charles A. Hanna and Charles W. Beall, of New York, and James L. Persons, of Montclair, N. J., representing considerable capital. The stock is to be increased from $400,000 to $1,200,000, application for which augmentation was made in Austin last week. As soon as matters pertaining to the reorganization permit, a meeting will be held for the naming of officers for the ensuing year. Extensive betterments it is said are being considered, but as the present plant is at least capable of furnishing gas to the residents of a city at least three times as large as Houston (on generating account), it looks to the writer that the money is to be put on main extensions. The main system by-the-way is as inadequate as the generating plant is excessive. However, the new scheme must be tried before being criticized."

AT the annual meeting of the shareholders in the Paterson and Passaic Gas and Electric Company, of Paterson, N. J., the officers elected were: Directors, Edward T. Bell, B. W. Spencer, John R. Lee, William B. Gourley, Randal Morgan, John Reynolds, John W. Ferguson, John Agnew, Hobart Tuttle, Walton Clark and Lewis Lillie; President, E. T. Bell; First Vice-President, Randal Morgan; Second Vice-President, B. W. Spencer; Treasurer, Lewis Lillie; Secretary, W. F. Douthirt; Assistant-Secretary and Treasurer, James Ball.

IT is understood that the plant and franchises of the South Amboy (N. J.) Gas Company have been acquired by and are now in control of Messrs. Philip J. Bowers and William S. Fairchild, of Newark, N. J. In the reorganization Mr. Bowers was chosen President and Mr. Fairchild was elected Treasurer. Report further has it that the main system will be largely extended. The mortgage indebtedness of the Company is $100,000. Messrs. A. P. Bachman, J. O. Ball and associates were the former owners.

THE residents of Pedricktown, N. J., have asked the proprietors of the Penn's Grove Gas Company to extend the gas mains to Pedricktown and vicinity.

THE Borough Bronze Company, to manufacture and deal in gas and electrical fixtures, has been incorporated by Messrs. Henry Cohen, Isadore Newburger and Gustave Cohen. Its capital is returned at $20,000, and its registered office address is Jersey City, N. J.

MR. EDGAR N. DICKSON, for many years in the employ of the Allis-Chalmers Company, has accepted a responsible position in the service of the Milwaukee Coke and Gas Company.

WRITE to the George M. Clark & Co., division of the American Stove Company, 71 Lake street, Chicago, for a copy of its excellent catalogue for the current year descriptive of the Company's Jewel gas stoves. Mr. Hubbard will take care of all inquiries on this account.

A CORRESPONDENT in Detroit, Mich., under date of March 2d, writes: "The Grand Rapids (Mich.) Gas Light Company will expend $150,000 in improvements this year. Four new buildings will be erected at the plant which will increase the Company's output to 4,000,000 feet per day. A water gas plant with a capacity of 1,000,000 feet will be erected, and it is planned to authorize the erection of another coal gas plant with a similar capacity next year. An exhauster room, a warehouse and men's quarters will also be erected. At the annual meeting Mr. Harry D. Walbridge, who has been President of the Company for 4 years, resigned in order that he might give his entire attention to his other business interests. Mr. Irvin Butterworth, Vice-President, was named in Mr. Walbridge's place. The officers of the Company now are: President and General Manager, Irvin Butterworth; Vice-President, Emerson McMillin; Secretary, Glenn R. Chamberlain; Treasurer, Miss Mary E. Kearney; Directors, Irvin Butterworth, James M. Barnett, Henry Idema, Lester J. Rindge, J. Boyd Pantlind, T. J. O'Brien, of Grand Rapids, and Emerson McMillin, H. D. Walbridge and Anton G. Hodenpyl, of New York."

THE many friends of Mr. John J. Power, Superintendent of the Cumberland (Md.) Gas Light Company, will sympathise with him in the sudden death of his daughter, Mrs. W. C. Barrow.

THE proprietors of the Pueblo (Cal.) Gas and Fuel Company are arranging for an extension of the gas supply to the outlying district of East Pueblo.

THE Albany and Hudson Light and Power Company, of Rennselaer, N. Y., has determined to order a 25 per cent. reduction in the selling rates for gas. This concession will virtually mean a rate of $1.50 per 1,000 cubic feet.

MR. A. A. SCHNAUFER has resigned the position of Manager of the Marietta (O.) Consolidated Gas Company. His successor is Mr. E. E. Forbes, of Emporium, Pa.

MR. J. B. MCKENZIE has been authorized to establish and maintain a gas plant in Richmond, Cal.

THE following is from a late issue of the Louisville (Ky.) *Post:* "Recent street talk relates to the gas stock owned by the city and its probable purchaser. Mr. W. F. Sheehan, former Lieutenant Governor of New York, paid Louisville a flying visit, and this led to the supposition that the old plan for the consolidation of all the lighting and heating plants of the city was up for auction. Mr. Sheehan's visit to Louisville lasted less than 24 hours. It can be said that if Mr. Sheehan came to conclude the purchase of the city's stock, he abandoned the idea or it got away from him. The Legislature has passed an enabling act, which authorizes the sale of the city stock, but an ordinance will have to be passed to consummate the sale. It is said other negotiations are under way. A broker, representing other parties, is quietly moving for the purchase of the city stock. As it would be only a minority interest, it is not believed the sale will be made until enough of the general stock is secured to give the purchasers control of the property. The Louisville Gas Company owns the Louisville Lighting Company, so it possesses great strategic value, and its present capitalization is not large. The capital stock of the Louisville Gas Company is $3,600,000, of which the city owns $925,000. The bonded debt is $500,000. The electric light plant is carried at a million dollars. The Lighting Company has secured the right to issue bonds for extension purposes, and these bonds are indorsed by the Gas Company. There is one other Company in the field, the Louisville Heating Company. It was in the beginning a 'natural gas' company, but it has secured the right to sell manufactured gas for heating purposes. Some Eastern promoters have suggested the consolidation of all the heating, lighting and power companies, including the traction company, with capital for the development of all properties, but that is merely a suggestion. While possible, and, from some standpoints, desirable, it is vague and distant. Before it could be accomplished great concessions would have to be made to the public and private consumers of light and heat and other concessions to the public using street car lines."

AGAIN, so rumor hath it, has the plant of the Downington (Pa.) Gas Company changed hands. This time it is said to have been taken over by New York capitalists.

THE Supervisors have fixed the legal rate for gas in San Francisco, for the year beginning July 1, 1905, at $1 per 1,000 cubic feet.

THE following is from the Meriden (Conn.) *Record*, dated the 3d inst.: "The Directors of the Meriden Gas Light Company have voted to reduce the price of gas from $1.35 to $1.25 per 1,000. Charles A. Learned, Manager of the Company, stated that the Company had reduced the price of gas from $1.80 per 1,000 to $1.25 in 10 years. On April 1, 1895, the price was reduced from $1.80 to $1.65; in April, 1898, it was again reduced to $1.50, and again in April, 1901, it was reduced to $1.35. The following change will go into effect April 1. All bills will be made out at the rate of $1.40 per 1,000 feet, but they will be subject to a discount of 15 cents per 1,000 if paid on or before the 10th. The present rate is $1.50 with a 10 per cent. discount which brings the amount down to $1.35 if paid before the 10th of the month. President Walter Hubbard has stated that the Company's policy has always been to pay the stockholders a reasonable dividend and give the balance to the customers. Mr. Hubbard, who is also President of the Meriden Electric Light Company, has stated that Meriden is having as good a street lighting service as any other city when compared with the various cities of the State. He said, 'In the first place,' Meriden and Middletown are the only two cities in the State where a full arc light is given. All other places are half arcs. That means a better and brighter light and, of course, it costs more. Then again different from many places in Connecticut, we burn our street lights a full 4,000 hours a year. In Wallingford, for instance, the street lights are burned only about 1,900 hours a year and they are half arc lights. Is it fair to make a comparison of cost between this city's service and that of the borough? In Hartford they have only a half arc light and more than that the light is furnished by water power, which is much cheaper than here as we have to make power here. When statistics are incomplete they are very misleading. We think Meriden is being given good service and apparently the Board of Public Works thought so when the street lighting contract was signed."

MR. EDWIN ALDRICH, President of the Woonsocket (R. I.) Gas Company, died in the offices of the Provident Building Company, Providence, R. I., the morning of the 1st inst. He was in his 69th year, having been born in Woonsocket, October 14, 1836.

THE proprietors of the San Francisco (Cal.) Coke and Gas Company are under the "painful necessity" of asking their shareholders to meet April 27th, for the purpose of voting on a proposition to "create a bonded indebtedness of $2,500,000 for the purpose of building a gas distributing system throughout San Francisco." A horse, a horse! My kingdom for a horse!

THE AMERICAN GAS LIGHT JOURNAL

A. M. CALLENDER & CO., PROPRIETORS.

THOS. J. CUNNINGHAM, ELBERT P. CALLENDER, EDITORS.

CHAS. E. SANDERSON, MANAGER.

MONDAY, MARCH 13, 1905.

The Market for Gas Securities.

The action yesterday (Thursday) of the legislators in the Senate end of the assemblage, respecting cheaper gas rates for New York city, seems to bear out that which we said some time ago—if gas is to be cheapened in New York city why not cheapen it in Albany, Troy, Utica, Kingston and other places too numerous to catalogue for any useful purpose. There will be no "drastic" legislation over gas rates in Albany this year. The prices for Consolidated gas are virtually those of a week ago—212½ to 213. City gas bonds are firmly held, and especial inquiry seems directed to original East River issues. The Company has arranged for the completion of something like 20,000,000 cubic feet additional storage capacity in the city. That is 4 holders, of 5,000,000 each. This construction is respectfully referred to the consideration of "flopper" Grout, whose knowledge of gas meters should qualify him as to the capacity of gasholders.

Brooklyn Union is 213 to 220. The new plant addition to its works will likely be on the site of the the old Citizens Company, Hoyt and 5th streets. Laclede preferred is 100 bid; Peoples, of Chicago, is 111⅜ to 111½; Washington (D.C.) is 340 to 342. No negro appointees have yet been commissioned for this Company. The general gas share market is strong.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

16 WALL STREET, NEW YORK CITY.

MARCH 13.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share.

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked.*
Consolidated	$73,177,000	100	212½	213
Central Union, Bonds, 5's.	3,000,000	1,000	108¼	110
Equitable Bonds, 6's	1,000,000	1,000	105	..
" 1st Con. 5's	2,300,000	1,000	118	120
Mutual	3,500,000	100	300	320
Municipal Bonds	750,000	..	..	..
New Amsterdam Gas Co..				
Bonds, 5's	11,000,000	1,000	112	113½
New York & Richmond Gas Co. (Staten Island)	1,500,000	100	35	.
1st Mtg. Gold Bds. 5 p. ct.	1,000,000	..	.	.
Northern Union, Bonds, 5's.	1,250,000	1,000	104	106
New York and East River..				
Bonds 1st 5's	3,500,000	1,000	112	114
" 1st Con. 5's	1,500,000	..	106¼	108½
Standard	5,000,000	100	125	130
Preferred	5,000,000	100	145	155
Bonds, 1st Mortgage, 5's	1,500,000	1,000	116	117
Yonkers	299,650	500	130	..
Out-of-Town Companies.				
Brooklyn Union	15,000,000	100	213	220
" " Bonds (5's)	15 000,000	1,000	113	115
Bay State	50,000,000	50	—	—
" ncome Bonds	2,000,000	1,000	..	75
Binghamton Gas Works..	450,000	100	28	30
" 1st Mtg. 5's	500,000	1,000	93	96
Boston United Gas Co.—				
1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000,000	1,000	47½	50
Buffalo City Gas Co.	5,500,000	100	5	5¾
" " Bonds, 5's	5,250,000	1,000	66	68½
Capital, Sacramento	500,000	50	..	35
Bonds (6's)	150,000	1,000	..	..
Chicago Gas Co. Guaranteed Gold Bonds	7,650,000	1,000	104	104¼
Cincinnati Gas and Electric Co	29,500,000	100	108¾	109
Columbus (O.) Gas Co., 1st Mortgage Bonds	1,500,000	1,000	97½	99
Columbus (O.) Gas Lt. & Heating Co	1,682,750	100	88¼	89¼
Preferred	3,026,500	100	107½	109
Consumers, Toronto	,000,000	50	200	204
Consolidated, Baltimore	11,000,000	100	85½	86½
Mortgage, 6's	3,600,000	..	..	118
Chesapeake, 1st 6's	1,000,000	..	..	..
Equitable, 1st 6's	910,000	..	..	..
Consolidated, 1st 5's	1,490 000	..	..	112
Consolidated Gas Co. of N.J.	1,000,000	100	15	17
" Con. Mtg. 5's	880,000	1,000	89½	92
Bonds	75,000	..	..	100
Detroit City Gas Co	4,825,500	50	..	50
" Prior Lien 5's	5,603,000	1,000	99½	100
Detroit Gas Co., 5's	381,000	1,000	75	75¼
" Inc. 5's	16,000	100	98½	100
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	..	101
Essex and Hudson Gas Co.	6,500,000	..	39	40
Fort Wayne	2,000,000	..	..	..
" Bonds	2,000,000	..	55	..
Grand Rapids Gas Lt. Co. 1st Mtg. 5's	1,225,000	1,000	104½	105
Hartford	750,000	25	190	200
Hudson County Gas Co., of New Jersey	10,500,000	..	104½	105½
" Bonds, 5's	10,500,000	..	107	108
Indianapolis	2,000,000	..	70	75
" Bonds, 6's	2,650,000	..	106½	108
Jackson Gas Co	250,000	50	82	..
" 1st Mtg. 5's	290,000	1,000	101	102½
Kansas City Gas Light Co., of Missouri	5,000,000	100	..	36
Bonds, 1st 5's	3,822,000	1,000	102	104
Laclede, St. Louis	10,000,000	100	..	..
Preferred	2,500,000	100	100	105
Bonds	10,000,000	1,000	108¼	109
Lafayette Gas Co., Ind.	1,000,000	100	..	60
Bonds	1,000,000	1,000	60	65
Louisville	2,570,000	50	136	140
Madison Gas & Elec. Co.				
" 1st Mtg. 6's	350,000	1,000	107½	108¼
" 6 per cent. scrip, due 1910	100,000	25	85	87
Montreal, Canada	2,000,000	100	218	218¾
Nashville Gas Lt. Co.	1,000,000	100	110	..
Newark, N. J., Con. Gas Co.	6,000,000	..	56	58
Bonds, 6's	4,600,000	..	105	105¾
New Haven	2,000,000	25	200	..
Peoples G. L. & Coke Co., of Chicago	25,000,000	100	111⅜	111⅝
Peoples Gas Lt. & Coke Co., Chicago, 1st Mortgage	20,100,000	1,000	..	..
2d "	2,500,000	1,000	104	
Rochester Gas & Elec. Co..	2,150,000	50	88	..
Preferred	2,150,000	50	118	..
Consolidated 5's	2,000,000	..	87½	90
San Francisco, Cal.	15,800,000	100	58¼	58¾
St. Joseph Gas Co.				
" 1st Mtg. 5's	751,000	1,000	94	96
St. Paul Gas Light Co	1,500,000	100	45	47
1st Mortgage 6's	650,000	1,000	113	116
Extension, 6's	600,000	1,000	113½	115
General Mortgage, 5's	2,465,000	1,000	92	93
Syracuse, N. Y.	1,975,000	100	50	55
Bonds	2,047 000	1,000	102	.
Washington, D. C	2,600,000	20	340	342
First mortgage 6's	600,000	..	..	..
Western, Milwaukee	4,000,000	..	..	..
Wilmington, Del	600.000	50	220	

Advertisers' Index.

GAS ENGINEERS.

A. E. Boardman, New York City 419
Baxter & Young, Detroit, Mich 412
B. E. Chollar, St. Louis, Mo 420
David Leavitt Hough, New York City 432
Davis & Farnum Mfg. Co., Waltham, Mass 432
Economical Gas Apparatus Construct'n Co., Toronto, Ont. 424
Frank D. Moses, Trenton, N. J 421
Fred. Bredel Co., Milwaukee, Wis 420
Frederic Egner, Washington, D. C 424
Geo. R. Rowland, New York City 428
Humphreys & Glasgow, New York City 433
Isbell-Porter Co., Newark, N J 434
J. Alex. Mayers, New York City 435
J. F. W. Jost, Philadelphia, Pa 428
Kerr Murray Mfg. Co., Fort Wayne, Ind 432
The Gas Machinery Co., Cleveland, O 420
The Jeffrey Manufacturing Co., Columbus, O 430
The Western Gas Construction Co., Fort Wayne, Ind. 400
United Gas Improvement Co., Philadelphia, Pa 427

GAS WORKS APPARATUS AND CONSTRUCTION.

A. E. Boardman, New York City 419
Bartlett, Hayward & Co., Baltimore, Md 433
Baxter & Young, Detroit, Mich 432
Connelly Iron Sponge and Governor Co., New York City 429
Continental Iron Works, Brooklyn, N. Y 434
Cruse-Kemper Co., Philadelphia, Pa 429
Davis and Farnum Mfg. Co., Waltham, Mass 432
Deily & Fowler, Philadelphia, Pa 436
Economical Gas Apparatus Construct'n Co., Toronto, Ont. 424
Empire Gas Construction & Improvement Co., N. Y. City 419
Frank D. Moses, Trenton, N. J 421
Fred. Bredel Co., Milwaukee, Wis 420
G. Shepard Page's Sons, New York City 432
Humphreys & Glasgow, New York City 433
Isbell-Porter Company, New York City 434
J. Alex. Mayers, New York City 435
Kerr Murray Mfg. Co., Fort Wayne, Ind 432
Lloyd Construction Co., Detroit, Mich 422
Logan Iron Works, Brooklyn, N. Y 426
Quintard Iron Works, New York City 431
R. D. Wood & Co., Philadelphia, Pa 434
Riter-Conley Mfg. Co., Pittsburg, Pa 435
Stacey Mfg. Co., Cincinnati, O 435
The Connersville Blower Company, Connersville, Ind. 437
The Gas Machinery Co., Cleveland, O 420
The Jeffrey Manufacturing Co., Columbus, O 430
The Western Gas Construction Co., Fort Wayne, Ind. 400
United Gas Improvement Co., Philadelphia, Pa 427

PROCESSES.

Bartlett, Hayward & Co., Baltimore, Md 433
B. E. Chollar, St. Louis, Mo 429
Economical Gas Apparatus Construct'n Co, Toronto, Ont. 424
Fred. Bredel Co., Milwaukee, Wis. 420
Humphreys & Glasgow, New York City 433
The Gas Machinery Co., Cleveland, O 420
The Western Gas Construction Co., Fort Wayne, Ind. 400
United Gas Improvement Co., Philadelphia, Pa. 427

SCRUBBERS AND CONDENSERS.

Continental Iron Works, Brooklyn, N.Y 434
Davis & Farnum Mfg. Co., Waltham, Mass. 432
Economical Gas Apparatus Construct'n Co., Toronto, Ont. 424
Fred. Bredel Co., Milwaukee, Wis 420
Isbell-Porter Co., Newark, N. J 434
Kerr Murray Mfg. Co , Fort Wayne, Ind 432
Logan Iron Works, Brooklyn, N. Y 426
R. D. Wood & Co., Philadelphia, Pa 434
Riter-Conley Mfg. Co., Pittsburg, Pa 435
Stacey Mfg. Co., Cincinnati, O 435
The Gas Machinery Co., Cleveland, O 420
The Western Gas Construction Co., Fort Wayne, Ind. 400

PRODUCER POWER PLANTS.

Economical Gas Apparatus Construct'n Co., Toronto, Ont. 424
R. D. Wood & Co., Philadelphia, Pa 434

TAR AND CARBONIC ACID EXTRACTOR.

Economical Gas Apparatus Construct'n Co., Toronto, Ont. 424
Fred. Bredel Co., Milwaukee, Wis 420
Isbell-Porter Co., Newark, N. J 434
Stacey Mfg. Co., Cincinnati, O 435
The Gas Machinery Co., Cleveland, O 420
The Western Gas Construction Co., Fort Wayne, Ind. 400

AMMONIA CONCENTRATORS.

Fred. Bredel Co., Milwaukee, Wis 420
Michigan Ammonia Works, Detroit, Mich 416
The Gas Machinery Co., Cleveland, O 420
The Western Gas Construction Co., Fort Wayne, Ind. 400

GAS METERS.

American Meter Co., New York and Philadelphia 439
Detroit Meter Company, Detroit, Mich 309
D. McDonald & Co., Albany, N.Y 437
Helme & McIlhenny, Philadelphia, Pa 439
John J. Griffin & Co., Philadelphia, Pa 440
Keystone Meter Co., Royersford, Pa 438
Maryland Meter and Mfg. Co., Baltimore, Md 438
Metric Metal Co., Erie, Pa 439
Nathaniel Tufts Meter Co., Boston, Mass 438

PREPAYMENT METERS.

American Meter Co., New York and Philadelphia 439
D. McDonald & Co., Albany, N. Y 437
Helme & McIlhenny, Philadelphia, Pa 439
John J. Griffin & Co., Philadelphia, Pa 440
Keystone Meter Co., Royersford, Pa 438
Nathaniel Tufts Meter Co., Boston, Mass 438

PREPAYMENT METER ATTACHMENTS.

Reeves Mfg. Co., New Haven, Conn 423

GAS AND WATER PIPES.

Central Foundry Co., New York City 424
Charles Millar & Son Co., Utica, N. Y 424
Davis & Farnum Mfg. Co., Waltham, Mass 432
Donaldson Iron Co., Emaus, Pa 424
Economical Gas Apparatus Construct'n Co., Toronto, Ont. 424
R. D. Wood & Co., Philadelphia, Pa 434
Warren Foundry and Machine Co., New York City 424

GAS COALS.

Berwind-White Coal Mining Co., New York and Phila. 430
Perkins & Co., New York City 430
Westmoreland Coal Co., Philadelphia, Pa 431

PECIALTIES FOR OIL AND PIPE LINES.
S. R. Dresser, Bradford, Pa..... 421

GAS MAIN STOPPERS.
Safety Gas Main Stopper Co., N.Y. City..... 424

MAIN AND SERVICE LAYING.
Sullivan Bros., Flushing, N. Y..... 395

GAS TAPPING MACHINES.
George Light, Dayton, O..... 424
H. Mueller Manufacturing Company, Decatur, Ills..... 422

CANNEL COALS.
Perkins & Co., New York City..... 430

STOKING MACHINERY.
G. A. Bronder, New York City..... 429

CONVEYORS.
Adam Weber Sons, New York City..... 428
C. W. Hunt Company, New York City..... 420
Economical Gas Apparatus Construct'n Co., Toronto, Ont. 424
Fred. Bredel Co., Milwaukee, Wis..... 420
G. A. Bronder, New York City..... 429
Kerr Murray Mfg. Co., Fort Wayne, Ind..... 432
The Brown Hoisting Machinery Co., Cleveland, O..... 431
The Gas Machinery Co., Cleveland, O..... 420
The Jeffrey Manufacturing Co., Columbus, O..... 430
The Link-Belt Engineering Co., Philadelphia, Pa..... 421
The Link-Belt Machinery Co., Chicago, Ills..... 424
The Western Gas Construction Co., Fort Wayne, Ind... 400

CHARGING BARROWS & COAL WAGONS.
Davis & Farnum Mfg. Co., Waltham, Mass..... 432
Kerr Murray Mfg. Co., Fort Wayne, Ind..... 432
Stacey Mfg. Co., Cincinnati, O..... 435

GAS ENRICHERS.
Standard Oil Co., New York City..... 391
Sun Company, Pittsburg, Pa..... 431
The Sun Oil Co., Pittsburg, Pa..... 431

COKE CRUSHERS.
C. M. Keller, Columbus, Ind..... 431
Fred. Bredel Co., Milwaukee, Wis..... 420
The Jeffrey Manufacturing Co., Columbus, O..... 430

STEAM BLOWER FOR BURNING BREEZE.
De Laval Steam Turbine Co., Trenton, N. J..... 415
The Connersville Blower Company, Connersville, Ind.. 437

ECONOMIZERS.
Green Fuel Economizer Co., Matteawan, N.Y..... 423

GAS GAUGES.
The Bristol Co., Waterbury, Conn..... 428

GAS GOVERNORS.
Connelly Iron Sponge and Governor Co., New York City 429
Fred. Bredel Co., Milwaukee, Wis..... 420
Isbell-Porter Co., Newark, N. J..... 434
R. D. Wood & Co., Philadelphia, Pa..... 434

CEMENTS.
C. L. Gerould, Bloomington, Ind..... 428

RETORTS AND FIREBRICKS.
Adam Weber Sons, New York City..... 428
Baltimore Retort and Firebrick Co , Baltimore, Md..... 426
Brooklyn Firebrick Works, Brooklyn, N. Y..... 428
Harbison-Walker Refractories Co., Pittsburg, Pa..... 417
Henry Maurer & Son, New York City..... 428
James Gardner, Jr., Co., Pittsburg, Pa..... 428
J. H. Gautier & Co., Jersey City, N. J..... 428
Laclede Firebrick Mfg. Co., St. Louis, Mo..... 428
Missouri Firebrick Co., St. Louis, Mo..... 428
Parker-Russell Mining and Mfg. Co., St. Louis, Mo..... 418

INCLINED RETORTS.
Adam Weber Sons (Graham, Morton [England] System) 428
Fred. Bredel Co., Milwaukee, Wis..... 420
Geo. G. Ramsdell, New York City..... 377
Parker-Russell Mining and Mfg. Co., St. Louis, Mo..... 418

VERTICAL S'S.
Adam Weber Sons (Oscar B. Weber's Construction)..... 428
Connelly Iron Sponge & Gov. Co. (Drake's [Eng.] System) 429
Fred. Bredel Co., Milwaukee, Wis..... 420
Parker-Russell Mining and Mfg. Co., St. Louis, Mo..... 418

VERTICAL RETORTS, CHARGING AND DISCHARGING VERTICALLY.
Adam Weber Sons, New York City..... 428

REGENERATIVE FURNACES.
Adam Weber Sons, New York City..... 428
Bartlett, Hayward & Co., Baltimore, Md..... 433
Fred. Bredel Co., Milwaukee, Wis..... 420
J. H. Gautier & Co., Jersey City, N. J..... 428
Laclede Firebrick Mfg. Co., St. Louis, Mo..... 428
Parker-Russell Mining and Mfg. Co., St. Louis, Mo..... 418

SELF-SEALING MOUTHPIECE DOORS.
Continental Iron Works, Brooklyn, N.Y. 434
Davis & Farnum Mfg. Co., Waltham, Mass..... 432
Fred. Bredel Co., Milwaukee, Wis..... 420
Isbell-Porter Co., Newark, N. J..... 434
Kerr Murray Mfg. Co., Fort Wayne, Ind..... 432
Logan Iron Works, Brooklyn, N.Y..... 436
R. D. Wood & Co., Philadelphia, Pa..... 434
Stacey Mfg. Co., Cincinnati, O..... 435
The Gas Machinery Co., Cleveland, O..... 420
The Western Gas Construction Co., Fort Wayne, Ind... 400

CHIMNEY CONSTRUCTION.
Adam Weber Sons, New York City..... 428

INCANDESCENT GAS LAMPS.
Central Lighting Co., New York City..... 419
D. M. Steward Mfg. Co., Chattanooga, Tenn..... 418
General Gas Light Co., Kalamazoo, Mich..... 419
Geo. G. Ramsdell, New York City..... 377
Welsbach Company, Gloucester, N. J..... 426

BURNERS.
Central Lighting Co , New York City..... 419
D. M. Steward Mfg. Co., Chattanooga, Tenn..... 418
Wm. M. Crane Co., New York City..... 421

LAVA GAS TIPS.
D. M. Steward Mfg. Co., Chattanooga, Tenn..... 418

STREET LAMPS.
Thos. T. W. Miner, New York City..... 420
Welsbach Street Lighting Co., New York and Phila.... 426

PURIFIERS.
Connelly Iron Sponge and Governor Co., New York City. 429
Davis & Farnum Mfg. Co., Waltham, Mass..... 432
Fred. Bredel Co., Milwaukee, Wis..... 420
Isbell-Porter Co., Newark, N. J..... 434
Kerr Murray Mfg. Co., Fort Wayne, Ind..... 432
R. D. Wood & Co., Philadelphia, Pa..... 434
Stacey Mfg. Co., Cincinnati, O..... 435
The Western Gas Construction Co., Fort Wayne, Ind.,. 400

PURIFYING MATERIALS.
Connelly Iron Sponge and Governor Co., New York City 429

VALVES.
Continental Iron Works, Brooklyn, N. Y..... 434
Davis & Farnum Mfg. Co., Waltham, Mass..... 432
Economical Gas Apparatus Construct'n Co., Toronto, Ont 424
Isbell-Porter Co., Newark N. J..... 434
Kerr Murray Mfg. Co., Fort Wayne, Ind 432
Ludlow Valve Manufacturing Co., Troy, N.Y..... 421
R. D. Wood & Co., Philadelphia, Pa..... 434
Stacey Mfg. Co., Cincinnati, O..... 435
The P. H. & F. M. Roots Co., Connersville, Ind..... 423
The Western Gas Construction Co., Fort Wayne, Ind.... 400

(*Continued on page* 416.)

DIVIDEND NOTICE.

OFFICE OF THE UNITED GAS IMPROVEMENT CO., N. W. CORNER BROAD AND ARCH STS., PHILADELPHIA, PA., Mar. 8, 1905.

The Directors have this day declared a quarterly dividend of 2 per cent. (one dollar per share), payable April 15th, 1905, to stockholders of record at the close of business, Mar. 31, 1905. Checks will be mailed.

1553-5 LEWIS LILLIE, Treasurer.

MRS. HELEN ARMSTRONG,
Teacher of Cookery.

Special Courses Prepared for Gas Companies.

Refers to the following companies, for whom such courses have been given:

Burlington, Vt.	Indianapolis, Ind.	Pueblo, Col.
Pittsfield, Mass.	Belleville, Ills.	Knoxville, Tenn.
New York City.	Anniston, Ala.	Waukesha, Wis.
	New Orleans, La.	

Engagements for the ensuing season are now being made.

Address, 159 WEST 66TH STREET,
1548-6 Chicago, Ills.

NOTICE!

PLEASE read the advertisement of the Empire Gas Improvement and Construction Company, on page 416. This Company employs only high-priced and quick-workiug mechanics, and all its work is guaranteed to be strictly first class, and will be finished at time specified.

A. M. SUTHERLAND,
1545-eot. tf. 49 Wall Street.

POSITION WANTED.

An American gas engineer, with technical education and wide experience in coal and water gas plants (six years in English gas works), desires engagement as engineer or manager of a gas works in this country or abroad Best of references from present employers and others, Address, "P.,"
1553-5 Care this Journal.

Situation Wanted.

A young man, having eight years' experience in the manufacture, distribution and development of gas plants and gas properties, wishes to become connected with a small coal or water gas company that is in need of a hustler. Nature of position and salary are of secondary importance. Am in position to accept any reasonable offer.
1553-1 Address, "STANDARD," care this Journal.

Position Wanted

By young man capable of assuming entire charge of either gas or electric plants or a combination plant. Can show experience in every department and furnish first-class references both as to ability and character from my present employers. Address, "C. S.,"
1552-4 Care this Journal.

Position Wanted.

The right man in the right place. The place for gas appliances is with the consumer. Get the man. He will do the rest.

Address, "T. E. D.,"
1553-[illegible] Care this Journal.

Position Wanted

By First-Class Meter Repairer,

With gas company. Understands distribution end of gas business.

Address, "METERS,"
1553-1 Care this Journal.

Position Wanted.

A man 42 years of age, for 18 years secretary and superintendent of small works, output 20,000,000 cubic feet, desires a position with a gas company. Would like similar engagement, but is open for anything within his capacity. Location immaterial. Can furnish best of references.

Address, "CENTAUR,"
1553-2 Care this Journal,

WANTED,
Skilled Gas Meter Maker.

Apply to gas works, 6th street corner of Provost street, Jersey City, N. J.
1551-4

WANTED,
A GAS PLANT

In a city of 15,000 or more. Address,

NATIONAL GAS & WATER COMPANY,
1546-3mos 184 LA SALLE ST., CHICAGO, ILLS.

WATER GAS SET WANTED.

Wanted, a water gas set; about 5 feet. Please reply at once, stating maker, age and condition. Address, "GASTON,"
1553-2 Care this Journal.

FOR SALE,

One 10-Horse Power Otto Gas Engine, Tank and Batteries,

Latest style; used six months. Address, the

SARATOGA GAS, ELECTRIC LIGHT & POWER CO.,
1545-tf Saratoga Springs, N. Y.

GASHOLDER FOR SALE.

We have a 31,000 cubic foot holder (50 feet in diameter) for sale. Holder is in brick tank. Erected by Deily & Fowler.

KALAMAZOO GAS COMPANY,
1552-tf KALAMAZOO, MICH.

Coal Tar Naphtha { Replaces expensive xylene and alcohol for removing naphthaline stoppages or deposits in gas mains.

1552-2mos BARRETT MFG. CO., PHILADELPHIA.

(*Concluded from page* 415.)

PUMPS.

De Laval Steam Turbine Co., Trenton, N. J..... 416

EXHAUSTERS.

Connelly Iron Sponge and Governor Co., New York City 429
Davis & Farnum Mfg. Co., Waltham, Mass..... 432
Isbell-Porter Company, Newark, N. J..... 434
Kerr Murray Mfg. Co., Fort Wayne, Ind..... 432
The Connersville Blower Company, Connersville, Ind... 437
The P. H. & F. M. Roots Co., Connersville, Ind..... 423

PURIFIER SCREENS.

John Cabot, Hoboken, N. J..... 420

GRATE BARS.

F. Ferguson & Son, Hoboken, N. J..... 424

GAS STOVES.

American Meter Co., New York and Philadelphia..... 439
Detroit Stove Works, Detroit and Chicago..... 438
Keystone Meter Co., Royersford, Pa..... 438
Maryland Meter and Manufacturing Co., Baltimore, Md. 438
Nathaniel Tufts Meter Co., Boston, Mass..... 438

HOT WATER HEATERS.

Humphrey Co., Kalamazoo, Mich..... 430

GASHOLDER TANKS.

J. P. Whittier, Brooklyn, N.Y..... 428

GASHOLDERS.

Bartlett, Hayward & Co., Baltimore, Md..... 433
Continental Iron Works, Brooklyn, N.Y..... 434
Cruse-Kemper Co., Philadelphia, Pa..... 429
Davis & Farnum Mfg Co., Waltham, Mass..... 432
Deily & Fowler, Philadelphia, Pa..... 436
Economical Gas Apparatus Construct'n Co., Toronto, Ont. 424
Kerr Murray Mfg. Co., Fort Wayne, Ind..... 432
Logan Iron Works, Brooklyn, N.Y..... 436
R. D. Wood & Co., Philadelphia, Pa..... 434
Riter-Conley Mfg. Co., Pittsburg, Pa..... 435
Stacey Mfg. Co., Cincinnati, O..... 435

STORAGE TANKS.

Davis & Farnum Mfg. Co., Waltham, Mass..... 432
Stacey Mfg. Co., Cincinnati, O..... 442

PAINTS.

American Standard Composition Co., New York City... 416
National Paint Works, New York City..... 432

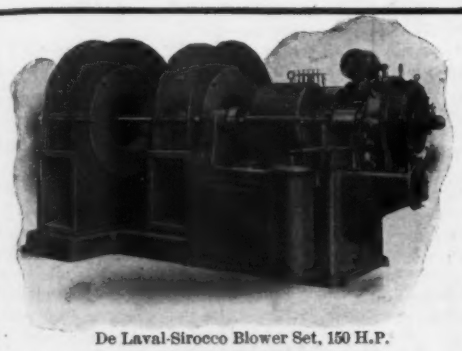
PATENTS, TRADE-MARKS, COPYRIGHTS.

Royal E. Burnham, Washington, D. C..... 420

STEAM TURBINES.

De Laval Steam Turbine Co., Trenton, N. J..... 416

Utilize Your Gas Liquor.
NO EXTRA LABOR OR OPERATING EXPENSES.
IMPROVED AMMONIA CONCENTRATOR.
About 100 in use. Write to
STROH & OSIUS, Patentees, or
MICHIGAN AMMONIA WORKS, - Detroit, Mich.



De Laval-Sirocco Blower Set, 150 H.P.

Steam Turbine Motors
Steam Turbine Dynamos
Steam Turbine Blowers
Steam Turbine Centrifugal Pumps
Electro-Motor Centrifugal Pumps

SEND FOR CATALOGUE.

REPRESENTATIVES:

D'Olier Engineering Co., - New York City, Philadelphia, Pa.
Chas. Garrison, - - - - - Boston, Mass.
The Turbine Engineering Co., - New York City, Chicago, Ill.
Denver Engineering Works Co., - - - - Denver, Col.
Florida Electric Co., - - - - Jacksonville, Florida.
Dravo, Doyle & Co., - - - - - Pittsburg, Pa.
Geo. P. Dravo, - - - - - - Milwaukee, Wis.
Chester B. Davis, - - - - - Dallas, Texas.
Joshua Hendy Machine Works, - - - San Francisco, Cal.
Kilbourne & Clark Co., - - - - Seattle, Wash.

DE LAVAL STEAM TURBINE COMPANY
Works and Sales Offices, TRENTON, N. J.

THE AMERICAN STANDARD COMPOSITION CO.
—) MANUFACTURES (—
HEAT PROOF AND DAMP PROOF PAINTS
For Structural Iron and Steel, Gas Apparatus, Underground Piping, Boiler Fronts, Stacks, etc.
Our Paints will not crack, peel or scale. Heat does not affect them. They are moisture proof.
They are the Paints that Don't Come Off!
We let you Try before you Buy. Send for samples and prices.
AMERICAN STANDARD COMPOSITION COMPANY,
1707, Wall Street Exchange Building, New York.

EMPIRE GAS IMPROVEMENT AND CONSTRUCTION CO.

This Company has purchased the patents and goodwill in the business hitherto carried on and owned by *A. M. Sutherland.* It is now ready to contract for the erection and installation of

ENTIRE GAS WORKS,

or any separate portion of the same, such as **Gasholders, Coal Gas Benches, Lowe-Sutherland** double-superheater **Water Gas Sets,** Scrubbers, Condensers, Exhausters, Purifying Boxes, Street Governors, Street Mains and Main Laying.

The high character of the work done by A. M. Sutherland during the past 15 years will be strictly adhered to and all work is warranted.

Mr. Sutherland remains with the Company for two years President and Director, and will give personal attention to contracts.

EMPIRE GAS IMPROVEMENT AND CONSTRUCTION CO., 49 Wall St., New York.

HARBISON-WALKER REFRACTORIES COMPANY,

Farmers Bank Building, Pittsburg, Pa.

REPRESENTING

HARBISON-WALKER CO.
PHILIPSBURG FIREBRICK CO.
CLEARFIELD FIREBRICK CO.
BASIC BRICK COMPANY,
CLINTON COUNTY F. B. CO.
FREDERICKS MUNRO CO.
WALLACETON FIREBRICK CO.

MANUFACTURERS OF

HIGH GRADE FIREBRICK

For Gas Plant Construction,

Chrome, Magnesia, and Silica Brick,

Ground Fireclay, Silica Cement, Dead Burned Magnesia and Chrome Ore.

We Carry in stock constantly at our various works a complete line of shapes in the following well-known brands:

BENEZET,	CLEARFIELD,	MUNRO	"W. F. B."
WOODLAND,	WIGTON STEEL,	EUREKA,	CORNING.
H. & W. SPECIAL,	WALLACE,	TYRONE,	CLINTON.

For use in every line of work in which refractory Material is required.

Catalogues will be furnished upon application. - - - Correspondence and trial orders solicited.

(In writing, kindly mention this Journal.)

SCIENTIFIC BOOKS.

ELECTRIC GAS LIGHTING. By H. S. Norrie. 50 cents.

GAS ANALYST'S MANUAL. By J. Abady. $6.50.

COX'S GAS FLOW COMPUTER. $2.50.

FIELD'S ANALYSIS, 1903. $5.

GAS AND GAS WORKS. By Hughes and O'Connor. $2.40

POOLE ON FUELS. By Herman Poole. $3.

GAS ENGINEER'S POCKET-BOOK. By Henry O'Connor $3.50.

TECHNICAL GAS ANALYSIS. By Winkler & Lunge. $4.

GAS CONSUMER'S HANDYBOOK, by Wm. Richards. 20 cents.

PRACTICAL TREATISE ON HEAT. By Thomas Box. 2d edition. $5.

PRACTICAL PHOTOMETRY: A Guide to the Study of the Measurement of Light. By W. J. Dibdin. $3.

CHEMICAL TECHNOLOGY: Vol. I., *Fuel and Its Applications*, $5. Vol. II., *Lighting*, $4.

IRONWORK: Practical Designing of Structural Ironwork. By H. Adams. $3.50.

HEMPEL'S GAS ANALYSIS, $2.25.

SELF-INSTRUCTION FOR STUDENTS IN GAS MANUFACTURE. $1.25.

LIQUID FUEL FOR MECHANICAL AND INDUSTRIAL PURPOSES. By E. A. Brayley Hodgetts. $2.50.

PRACTICAL HANDBOOK ON GAS ENGINES, by G. Lieckfeld. $1.

HEAT A MODE OF MOTION. By John Tyndall. $2.50.

THEORY OF HEAT. By J. Clerk-Maxwell. $1.50.

MANUAL FOR GAS ENGINEERING STUDENTS. By D. Lee. 40 cents.

AMMONIA AND AMMONIUM COMPOUNDS. By Dr. R. Arnold. $2.

A TREATISE ON THE COMPARATIVE COMMERCIAL VALUES OF GAS COALS AND CANNELS. By D. A. Graham. $3.

A TEXT BOOK OF INORGANIC CHEMISTRY. By Prof. Victor Von Richter. $2.

ILLUMINATING AND HEATING GAS. By W. Burns. $1.50

HANDBOOK FOR MECHANICAL ENGINEERS. By H. Adams. $2.50.

TREATISE ON MASONRY CONSTRUCTION. Baker. $5.

GAS ENGINEER'S LABORATORY HANDBOOK. By Jno. Hornby. $2.50.

FINANCES OF GAS AND ELECTRICITY MANUFACTURING ENTERPRISES. By Wm. D. Marks. $1.

PRACTICAL PLUMBING. By P. J. Davies. Vol. I. $3, Vol. II. $4.50.

AMERICAN PLUMBING. By Alfred Revill. $2.

A COMPARISON BETWEEN THE ENGLISH AND FRENCH METHODS OF ASCERTAINING THE ILLUMINATING POWER OF COAL GAS. $1.60.

ELECTRICITY.

INDUSTRIAL PHOTOMETRY, with Special Application of Electric Lighting. By A. Palaz, Sc.D. $4.

ELEMENTS OF ELECTRIC LIGHTING, Including Electric Generation, Measurement, Storage and Distribution. By Philip Atkinson. $1.50.

ELECTRIC TRANSMISSION OF ENERGY. By G. Kapp. $3.50.

ELECTRICIAN'S POCKET-BOOK. By Monroe and Jamieson. $2.50.

DYNAMO BUILDING. By F. W. Walker. 50 cents.

DOMESTIC ELECTRICITY FOR AMATEURS. By E. Hospitalier. $2.50.

PRACTICAL MANAGEMENT OF DYNAMOS AND MOTORS. $1.

PRACTICAL GUIDE TO THE TESTING OF INSULATED WIRES AND CABLES. $1.

ELECTRIC LIGHTING, by Francis B. Crocker. $3.

ELECTRIC LIGHT FITTING. $2.

PRACTICAL ELECTRICITY. $2.50.

ELECTRICITY FOR ENGINEERS. $2.50.

ELECTRICITY, Its Theory, Sources and Applications. By John T. Sprague. $6.

The above will be forwarded upon receipt of price. If sent by mail or express, postage or express charges must be added to above prices. We take especial pains in securing and forwarding any other Works that may be desired, upon receipt of order. All remittances should be made by check, draft, or post office money order. No books sent C.O.D.

A. M. CALLENDER & CO., 42 PINE ST., NEW YORK.

PARKER-RUSSELL MINING AND MFG. CO.,

OF ST. LOUIS, MO.,

PROPRIETORS OF THE

OAK HILL GAS RETORT AND FIREBRICK WORKS.

ST. LOUIS OFFICE: 417 Pine Street. NEW YORK OFFICE: Aldrich Court, 45 Broadway.

WE MAKE A SPECIALTY OF WATER GAS LININGS AND CHECKER BRICK.

Half and Full Depth Benches of Our Own Design, Containing 6, 8 or 9 Retorts.

SLOPERS.--We have perfected plans of INCLINED RETORT BENCHES, designed to meet conditions prevailing in America, and constructed entirely of American materials.

We Build Benches Complete. Ready for Gas Making. Also,

RETORT HOUSES,

COAL and COKE CONVEYING MACHINERY.

Plans, Specifications and Estimates Cheerfully Furnished.

CORRESPONDENCE SOLICITED.

ALL CONTRACTS MADE AS OF ST. LOUIS, MO.

Gold Medals awarded by the Louisiana Purchase Exposition at St. Louis, for fireclay gas retorts, gas retort benches, firebrick and setting tiles.

WHAT A PLEASURE IT IS!

To *please* your consumers. What *pleases* them *pleases* you. Steward Burners *please* everybody. Won't you *please* give us the pleasure of *pleasing* your consumers. *Please* do.

D. M. STEWARD MFG. CO., Est. 1876, CHATTANOOGA, TENN.

THE SEVENTH EDITION, ILLUSTRATED,

— OF THE —

Handbook for Gas Engineers and Managers,

By THOMAS NEWBIGGING, M. INST. C.E.

This Edition of the "Handbook for Gas Engineers and Managers" is a great improvement on all previous editions. Much of the text has been re-written, in order to keep the work abreast of the constant advances that are being made in the Gas Industry.

PRICE, · $6.50.

A. M. CALLENDER & CO., 42 Pine Street, New York City.

FIELD'S ANALYSIS

For the Year 1903.

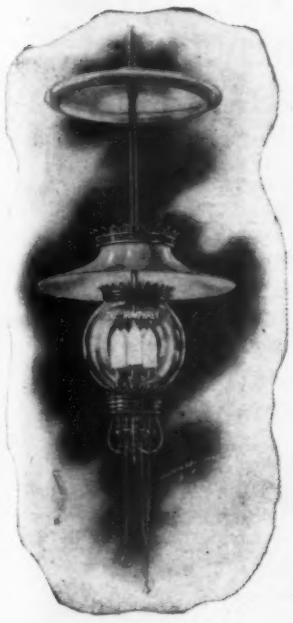
An Analysis of the Principal Gas Undertakings in England, Scotland and Ireland. Being the 35th Year of Publication.

COMPILED AND ARRANGED BY **JOHN W. FIELD,**

Secretary and General Manager of The Gas Light and Coke Company, London.

PRICE, $5. FOR SALE BY

A. M. CALLENDER & CO., 42 PINE ST., NEW YORK CITY.



SPEAKING OF BUSINESS POSSIBILITIES, one city of 30,000 people has 1,600 Humphrey Lamps in use and is steadily installing more. The gas consumed in these lamps last year equalled the total sales for all purposes ten years ago. We will be pleased to give full particulars. :: :: :: ::

* * * * * * * * *

GENERAL GAS LIGHT CO.,

Kalamazoo, Mich.

NEW YORK. SAN FRANCISCO. LONDON.

The "Air-Light"

Premier Burner Of America.

GENUINE "AIR-LIGHTS,"

A NEW BURNER FOR 1905.

AGENTS WANTED EVERYWHERE.

Increased in Value. Decreased in Price.

A High-Class Burner, a Rapid Seller, and a Money Maker for Agents, Dealers, Gas Companies, etc.

DENAYROUZE TRADE MARK AIR-LIGHT REGISTERED PAT. 673705 MAY 7 1901

CENTRAL LIGHTING CO., 86 Warren Street, New York, N. Y.

Write or Call for Prices and Particulars.

ARTHUR E. BOARDMAN, C.E.,

For several years associated with the late

CAPTAIN WILLIAM HENRY WHITE,

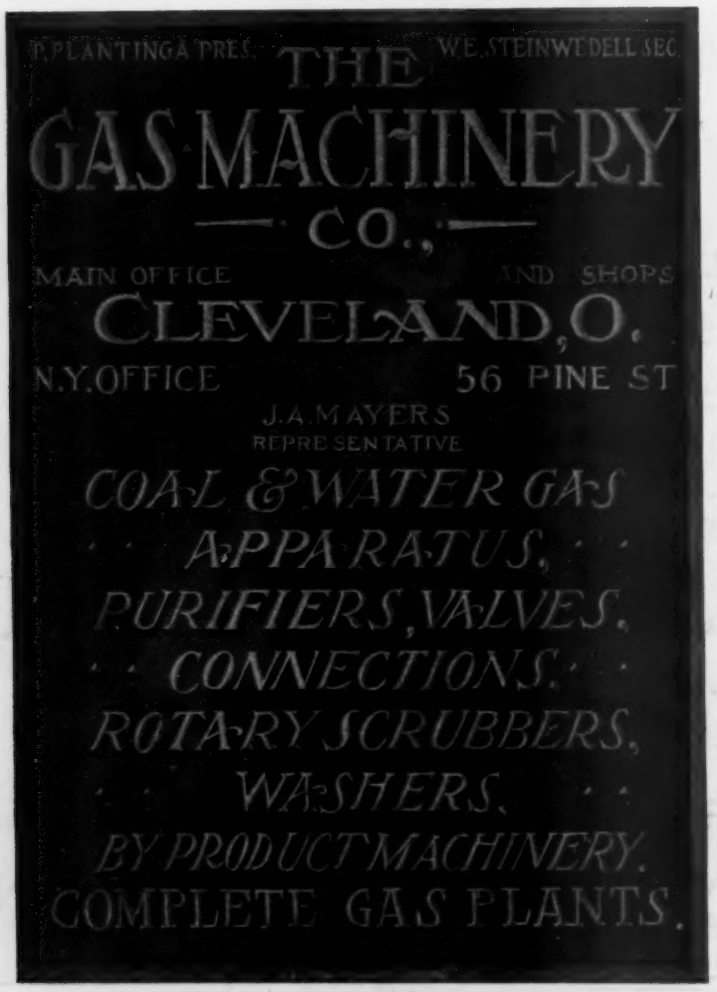
WILL CONTINUE THE BUSINESS OF

CONSULTING ENGINEER

For Gas, Water and Electric Light Companies, at

No. 41 Wall Street, Room 1707, New York.

TELEPHONE, 5534 BROAD.



PATENTS, TRADE MARKS, COPYRIGHTS.

ROYAL E. BURNHAM,

Solicitor of Patents and Counsellor in Patent Causes.

833 Bond Building, Washington, D. C

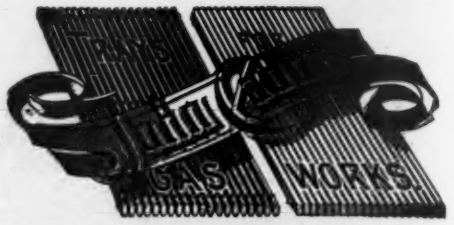
Send for Pamphlet on Patents.

1418-tf

Church's Patent Trays.

Reversible; Strongest; Most Easily Repaired.

Special Trays for Iron Sponge.



1412-1416 Adams Street, Hoboken, N. J.

We also Supply the Chapest and Strongest

•Reversible Bolted Trays•

IN THE MARKET.

SEND FOR BOOKLET AND CIRCULARS.

"THE MINER"

Globe Street and Boulevard Lamps.

Cheapest and Best

THOUSANDS IN USE WITH INCANDESCENT BURNERS.

Send for Catalogues.

THOMAS T. W. MINER,

821-823 Eagle Av., N.Y.

Gas Analyses of All Sorts and Conditions

—OR—

Analyses of Solid and Liquid Materials as Well,

That are needed by Gas Companies at any time in the conduct of their business, may be obtained from

DR. W. H. BIRCHMORE,

1421-tf 341 ADELPHI ST., BROOKLYN, N. Y.

This is No. 2.

Height, 36 inches.
Diameter, 12 "
Shipping weight, 80 lbs.
Net weight, 50 lbs.
The products of combustion are entirely separate from the water. Entire water surfaces are tinned.

Price, $35.00.

HOT WATER

FOR BATHROOM AND KITCHEN

is most easily, quickly and economically supplied by a

Humphrey Crescent Instantaneous Water Heater.

Prices range from $20 to $45.
Every Heater GUARANTEED.

Set a heater for every gas consumer. You will please them and increase sale of gas at the same time.

Send to-day for catalogue and discounts to

HUMPHREY CO.,

Kalamazoo, Mich.,

The only manufacturers in the World of a COMPLETE LINE OF INSTANTANEOUS WATER HEATERS.

FRED. BREDEL, President. **WM. O. VILTER, Vice-President.** **O. W. GREENSLADE, Secretary and Treasurer.**

FRED. BREDEL COMPANY,

ENGINEERS AND BUILDERS OF GAS PLANTS.

Inclined Benches, own system, Recuperative Furnaces, Exhausters, Exhauster Governors, Condensers, Washers, Coolers, Wet Purifying Plants, Purifiers, Oxide Elevators, Hydraulic and Dry Coke Conveyors.

Special High Grade Material for Recuperative Furnaces.

Licensees for ARROLL-FOULIS Charging and Discharging Machines and FRONHAUSER Coke Conveyors. **OFFICE, 405 KEENE ST., MILWAUKEE, WIS**

You can buy burners
that cost less than

BRAY BURNERS,

But all you save on the first cost will be lost a hundred times over in the increased number of complaints and dissatisfied consumers.

DON'T PUT GOOD GAS IN THE HOLDER AND SPOIL IT AT THE BURNER.

BRAY BURNERS

Have been used by the largest Gas Companies for over forty years, because

THE PROGRESSIVE GAS MAN ONLY WANTS THE BEST.

W. M. CRANE COMPANY,

NEW YORK,

Have you a Bray Blue Book? SOLE AGENTS FOR THE UNITED STATES.

THE

Ludlow Valve Mfg. Co.,

TROY, N. Y., U. S. A.

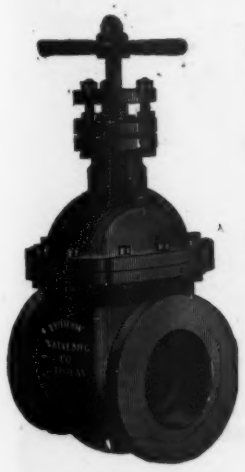
Double and Single Gate Valves, ¼" to 72",

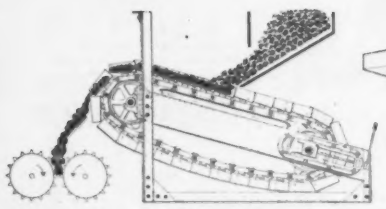
—FOR—

Gas, Water, Steam, Oil, Ammonia, Etc.

HOT GAS VALVES A SPECIALTY.

Send for Catalogue.





1814

THE LINK-BELT CONTINUOUS APRON FEEDER

supplies run-of-mine bituminous and lump anthracite coal to crushers in a steady, constant stream. It prevents choking and reduces the power required to operate the crusher.

It dispenses with a man at the feeding gate.

LINK-BELT ENGINEERING CO.,

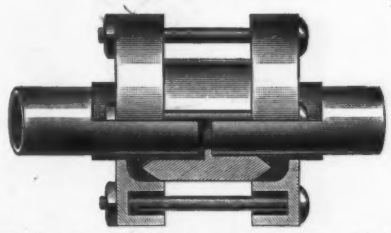
PHILADELPHIA.

NEW YORK: 49 Dey Street.
PITTSBURG: Park Building.
CHICAGO: Link-Belt Machinery Co.

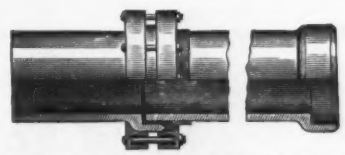
S. R. DRESSER,

BRADFORD, PENNSYLVANIA, U. S. A.,

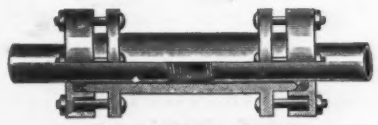
Patentee and Manufacturer of Specialties for Oil and Gas Lines.



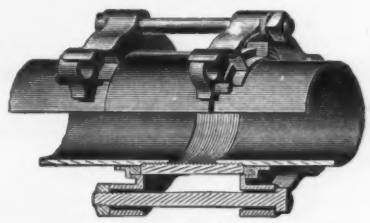
Insulating Coupling for Wrought Iron Pipe. Style 8.



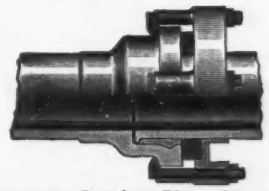
Insulating Coupling for Dresser Bell and Spigot Cast Iron Pipe. Style 6.



Regular Sleeve. Style 2.



Clamp. Style 4.



Clamps for Cast Iron Pipe. Style 4½.

Pipe Couplings, Sleeves, Clamps, Crosses, Tees and Ells.

My Insulating Coupling prevents the destruction of pipe by electrolytic action, in either water or gas lines.

SEND FOR CATALOGUE.

FRANK D. MOSES,

Telephone, 204-A — TRENTON, N. J., — Telephone, 204-A

Constructing Engineer and Contractor.

Estimates Furnished on any kind of Work in Connection with Gas or Water Plants.

SPECIAL ATTENTION GIVEN TO THE REMODELLING AND EXTENDING OF THE PROPERTIES OF WORKS NOT UP-TO-DATE.

CORRESPONDENCE SOLICITED.

LLOYD'S P. & A.

Total daily capacity sold during January, 1905,

40,300,000.

LLOYD CONSTRUCTION CO.,
DETROIT, MICH.

MUELLER PIPE END REAMER.

RATCHET HANDLE PATTERN.

C—035.

If a pipe reamer has to be turned back for a new start after a partial cut is made, the shaving first made may cling to the pipe and make it difficult to do clean work.

With Mueller Ratchet Handle Pipe Reamers it is easy to make a continuous clean cut. The ratchet permits the handle to be moved back without moving the blades, so that each blade has only its own shaving clinging ahead of it.

Mueller Pipe Reamers will ream any size of pipe, from ⅜ to 3-inch. They are made in plain handle and ratchet handle patterns. The reamer illustrated is the ratchet handle pattern.

Each reamer is carefully inspected as near like actual service use as possible, *conditionally guaranteed.* and assembled, is given a working test bears the Mueller trade mark, and is *un-*

We also make a full line of gas cocks, meter connections and tapping machines for gas works' use. Catalogues upon application.

EASTERN DIVISION—Located at 254-258 Canal Street (cor. Elm), New York City, carries a full stock of Mueller goods.

THREE GRAND PRIZES were awarded Mueller Water, Gas and Plumbing goods, respectively, at St. Louis.

H. MUELLER MFG. CO.,

DECATUR, ILL., U. S. A. NEW YORK, N. Y., U. S. A.

ROOTS' GAS EXHAUSTERS.

GOLD MEDAL AT ST. LOUIS, 1904.

Installation showing our latest improved machines, with flexible rope coupling, for large units.

SEND FOR CATALOGUE.

HOME OFFICE:
Connersville, Ind.

NEW YORK OFFICE:
120-122 Liberty St.

CHICAGO OFFICE:
1547 Marquette Building.

USE YOUR OWN

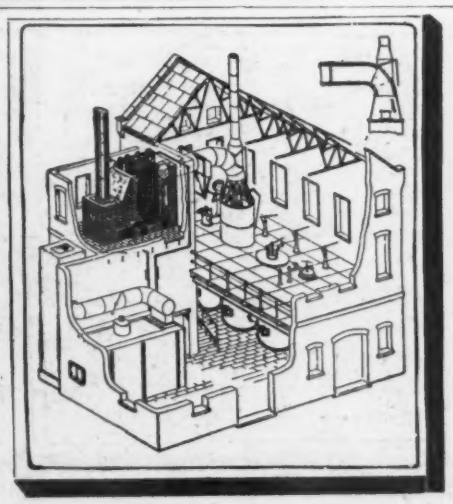
JUDGMENT.

We can send you scores of testimonials from customers, but if you are not yet using our attachments we will send you a sample, free. Try it. If not the BEST you have ever used, we will not expect your trade. :: :: :: :: :: :: Long warning to consumers, entirely preventing fatal accidents. Other important features.

REEVES MFG. CO., - - - - - New Haven, Conn.

Saving in Fuel, 25 Per Cent.

Steam-Fuel GREEN'S ECONOMIZER



Increased Boiler Capacity, 25 Per Cent.

Actually accomplished these results after being installed in the plant of the New Haven Gas Works.

Booklet Free.

THE GREEN FUEL ECONOMIZER CO.,

Having done it for them, isn't it reasonable to suppose we can do it for you?

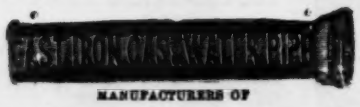
If you'd like us to estimate, the services of our experts are at your command—no charge.

MATTEAWAN, N. Y. { Sole Manufacturer In the U. S. A.

GEORGE ORMROD, Mangr. & Treas., Emaus, Pa.
JOHN DONALDSON, Prest., Betz Bldg., Phila., Pa.

EMAUS PIPE FOUNDRY.

DONALDSON IRON COMPANY. EMAUS, PA.



MANUFACTURERS OF

CAST IRON PIPE AND SPECIAL CASTINGS

FOR WATER AND GAS.

Also, FLANGE PIPE, LAMP POSTS, Etc.

GAS TAPPING MACHINES

—FOR—

Drilling and Tapping Pipe under Pressure

WITHOUT ANY ESCAPE OF GAS.

They are Strong and Compact.

Size of Combination Drills and Taps ¾ to 4-inch.

Machines Sent to any Gas Company for Thirty Days' Trial.

Send for Circulars.

Geo. Light,
DAYTON, O.

THE ECONOMICAL GAS APPARATUS CONSTRUCTION COMPANY, LIMITED,

Consulting Engineers.

Builders of UP-TO-DATE Machinery and Appliances for Coal and Water Gas Plants. :: :: :: :: ::

PLANS,
SPECIFICATIONS
AND ESTIMATES
PREPARED.

AMERICAN OFFICE:
269 Front St., East, Toronto, Canada.

FREDERIC EGNER,
Gas Engineer,
NORFOLK, VA.,

May be consulted with reference to estimates of cost for new, or appraising actual value of existing works; utility of proposed or patented processes; relative earning power to capitalization, and management.

J. F. W. JOST,
CHEMICAL ENGINEER
—IN—
GAS MANUFACTURE,
P. O. BOX 2043. PHILADELPHIA, PA.

WARREN FOUNDRY AND MACHINE CO.,

Established 1856. Works at Phillipsburgh, N. J.

New York Office, 160 Broadway.

CAST IRON WATER AND GAS PIPE,

FROM THREE TO FORTY-EIGHT INCHES DIAMETER. ALSO, ALL SIZES OF

Flange Pipe for Sugar House and Mine Work. Branches, Bends, Retorts, etc., etc.

UNIVERSAL PIPE HAS

METALLIC JOINTS
THAT DO NOT LEAK.
WRITE FOR NEW CATALOG.

CENTRAL FOUNDRY COMPANY, - - 116 M Nassau Street, New York City.

CHARLES MILLER & SON CO., Selling Agents, Utica, N.Y.

Flanged Pipe and Fittings, Hydrants, Gates, Pig Lead, Jute, etc.

UTICA PIPE FOUNDRY CO.

Manufacturers of Lead Pipe, Solder, etc., and Jobbers of Plumbers' and Tinners' Goods.

CAST IRON PIPE and SPECIALS FOR WATER AND GAS.

Wholesale Eastern Agents AKRON VITRIFIED SEWER PIPE.

SAFETY GAS MAIN STOPPER COMPANY,

For Shutting Off Gas in Mains

Temporarily during alterations and repairs. : : : :

Any size gas main can be shut off in 30 seconds. : : :

STOPPERS SENT ON TRIAL.

Address: SAFETY GAS MAIN STOPPER CO., 108 E. 117th St., New York City.

FOX HILL FOUNDRY,

F. FERGUSON & SON,

HOBOKEN, N. J.

FINE OPENING

GRATE BARS

FOR GAS WORKS.

STATIONARY, SHAKING, DUMPING.

BARS FOR HAZELTON BOILERS.

LINK-BELT

OPEN TOP CARRIER.

ESPECIALLY ADAPTED FOR HANDLING

Coal, Coke, Ashes, Stone, Ores,

Or any heavy or gritty materials, where strength and durability are essential. Constructed in any length or capacity, and to suit local conditions.

WRITE FOR CATALOG

The Link-Belt Machinery Co.
Link-Belt Engineering Co. Philadelphia
Chicago, U.S.A.

AMERICAN METER CO.,

NEW YORK, ST. LOUIS, PHILADELPHIA, SAN FRANCISCO, CHICAGO,

Photometrical and Experimental Apparatus.

PUBLIC LIGHTING TABLE.

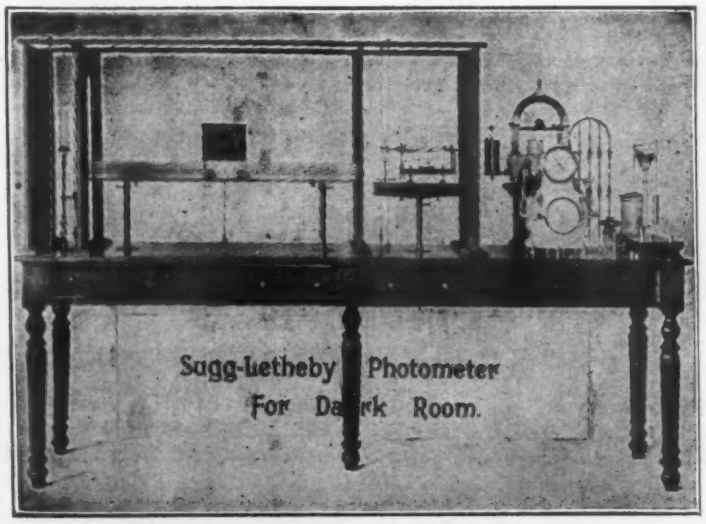
MARCH, 1905.

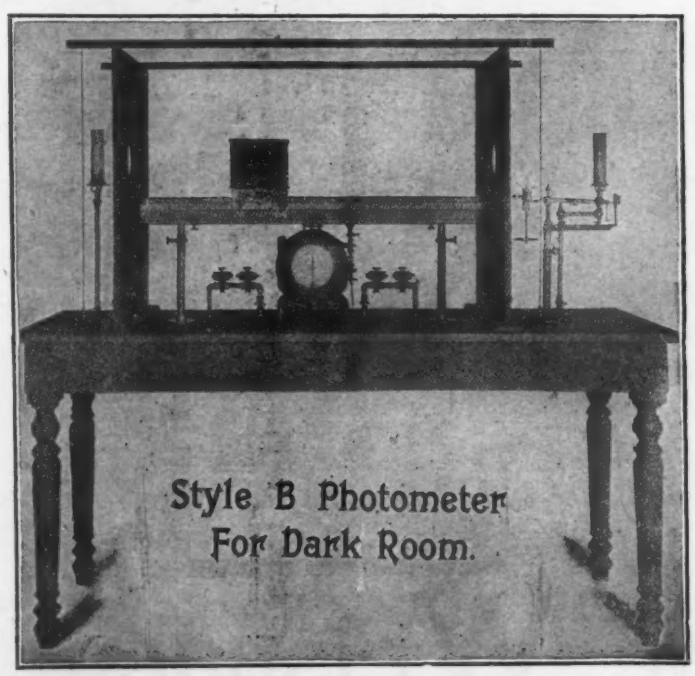
Day of Week.	Table No. 1. FOLLOWING THE MOON. Date.	Light.	Extinguish.
Wed.	1	6.20 PM	5.20 AM
Thu.	2	6.20	5.30
Fri.	3	6.20	5.30
Sat.	4	6.20	5.30
Sun.	5	6.30 NM	5.20
Mon.	6	6.30	5.20
Tue.	7	6.30	5.20
Wed.	8	6.30	5.20
Thu.	9	6.30	5.20
Fri.	10	9.10	5.20
Sat.	11	10.10	5.20
Sun	12	11.10	5.10
Mon.	13	12.00 FQ	5.10
Tue.	14	1.00 AM	5.10
Wed.	15	1.50	5.10
Thu.	16	2.40	5.10
Fri.	17	3.20	5.10
Sat.	18	4.10	5.10
Sun.	19	No L.	No L.
Mon.	20	No L. FM	No L.
Tue.	21	No L.	No L.
Wed.	22	6.40 PM	9.10 PM
Thu.	23	6.40	10.30
Fri.	24	6.40	11.30
Sat.	25	6.40	12.40 AM
Sun.	26	6.50	1.40
Mon.	27	6.50 LQ	2.30
Tue.	28	6.50	3.20
Wed.	29	6.50	4.00
Thu.	30	6.50	4.40
Fri.	31	6.50	4.40

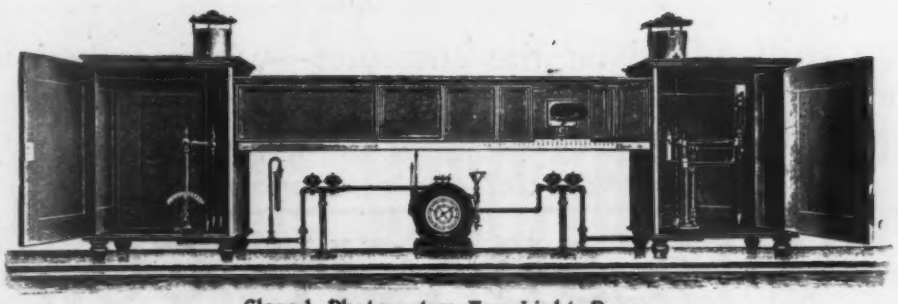
TOTAL HOURS DURING 1905.

By Table No. 1.

	Hrs.Min.
January	240.50
February	192.20
March	207.00
April	175.10
May	161.00
June	139.50
July	149.00
August	161.50
September	173.00
October	205.00
November	211.00
December	229.00
Total, yr.	2245.00







Closed Photometer For Light Room.

CIRCULARS SENT ON REQUEST.

PUBLIC LIGHTING TABLE.

MARCH, 1905.

Day of Week.	Table No. 2. NEW YORK CITY. ALL NIGHT LIGHTING. Date.	Light P.M.	Extinguish. A.M.
Wed.	1	5.30	5.45
Thu.	2	5.30	5.45
Fri.	3	5.30	5.45
Sat.	4	5.30	5.45
Sun.	5	5.40	5.35
Mon.	6	5.40	5.35
Tue.	7	5.40	5.35
Wed.	8	5.40	5.35
Thu.	9	5.40	5.35
Fri.	10	5.40	5.35
Sat.	11	5.40	5.35
Sun.	12	5.50	5.20
Mon.	13	5.50	5.20
Tue.	14	5.50	5.20
Wed.	15	5.50	5.20
Thu.	16	5.50	5.20
Fri.	17	5.50	5.20
Sat.	18	5.50	5.20
Sun.	19	6.00	5.10
Mon.	20	6.00	5.10
Tue.	21	6.00	5.10
Wed.	22	6.00	5.10
Thu.	23	6.00	5.10
Fri.	24	6.00	5.10
Sat.	25	6.00	5.10
Sun.	26	6.10	4.55
Mon.	27	6.10	4.55
Tue.	28	6.10	4.55
Wed.	29	6.10	4.55
Thu.	30	6.10	4.55
Fri.	31	6.10	4.55

TOTAL HOURS DURING 1905.

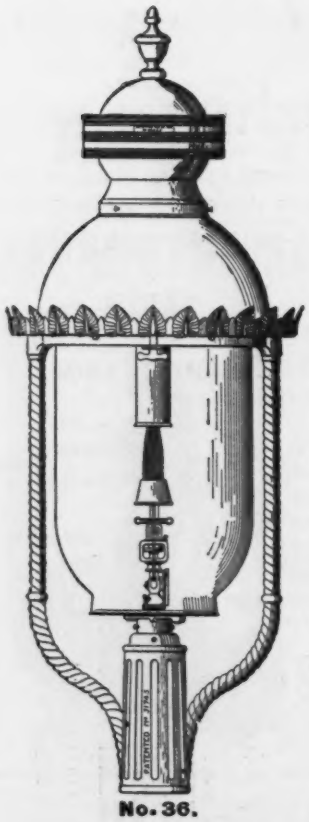
By Table No. 2.

	Hrs.Min.
January	423.20
February	355.25
March	355.35
April	298.50
May	264.50
June	234.25
July	243.45
August	280.25
September	321.15
October	374.30
November	401.40
December	433.45
Total, yr.	3987.45

NEW YORK, 97 Liberty Street. BOSTON, 814 Beacon Building. PHILADELPHIA, Broad and Arch Streets. ST. LOUIS, 712 Roe Building. CHICAGO, Foot of Orleans Street. SAN FRANCISCO, 712 Polk Street.

WELSBACH STREET LIGHTING COMPANY

.... OF AMERICA ....



No. 36.

Controls and Operates the

Welsbach System of Street Lighting,

Which includes its specially DESIGNED AND PATENTED BURNER for STREET and PARK LIGHTING exclusively.

Uniformly SUCCESSFUL in 150 Cities and Towns.

By means of the Welsbach System of street lighting the superiority of GAS over electricity for street lighting has been fully demonstrated.

POINTS OF MERIT:

It is { Economical, Attractive, Successful, Up-to-date.

IT LIGHTS THE STREET.

Where there are no gas mains we can furnish an equally good light by our SELF-GENERATING NAPHTHA WELSBACH BURNER, and thereby supply a uniform light in all localities.

Correspondence Solicited from Gas Companies and Others interested in Municipal and Outside Lighting.

No. 38.

AN underlying principle in business is to show an increase each year---to grow. The astute dealer not only seeks to retain this year's customers, but to attract new trade next year.

The formula is simple---

THIS SHIELD IS THE WELSBACH TRADE MARK.

IT IS A GUARANTEE AND A PROTECTION.

Sell The Welsbach Brands.

The imitation stuff is bad for the customer---which is bad for you.

The genuine Welsbachs---Burners or Mantles---make satisfied customers---keep customers---MAKE NEW ONES.

And your profit isn't merely dollars and cents.

WELSBACH CO.,

Broad and Arch Sts., PHILADELPHIA.

THE UNITED GAS IMPROVEMENT COMPANY

For the Year Ending December 31st, 1904, has been Awarded Contracts for 45 Sets of

Standard Double-Superheater Lowe Water Gas Apparatus.

PARTIAL LIST OF PLACES:

Harrisburg, Pa.
Pelham, N. Y.
Reading, Pa.
Augusta, Me.
Bangor, Pa.
Woonsocket, R. I. (2d contract).
Brooklyn, N. Y. (4th contract).
Cincinnati, O. (2d contract).
Scranton, Pa. (3d contract).
New York City (14th contract).
New Haven, Conn. (2d contract).
Watertown, N. Y.
Tampa, Fla. (3d contract).
Westchester, N. Y. (3d contract).
Bridgeport, Conn. (2d contract.)
St. Paul, Minn. (2d contract).
Springfield, Mass. (2d contract).
Lynn, Mass. (5th contract).
Rochester, N. Y.
Battle Creek, Mich.
Mechanicsburg, Pa.
Excelsior Springs, Mo.
Bristol, Conn.
Jersey Shore, Pa.
Vicksburg, Miss.

TOTAL SETS, 1904, ... 45
TOTAL DAILY CAPACITY, 1904, ... 56,325,000 cubic feet.
TOTAL SETS TO DATE, ... 553
TOTAL DAILY CAPACITY, ... 419,180,000 cubic feet.

The United Gas Improvement Company,

Broad and Arch Streets, Philadelphia

Established 1858. Incorporated 1890.
CHAS. E. GREGORY, Prest. DAVID R. DALY, V.-Prest. & Treas.
H. D. ABERNETHY, Sec.

J. H. Gautier & Co.

Greene & Essex Streets,
Jersey City, N. J.

MANUFACTURERS OF

CLAY GAS RETORTS, FIRE CLAY TILES, FIRE BRICK and FIRE CLAY SPECIALTIES.

Ground Fire Clay, Fire Sand and Ground Fire Brick in Barrels and Bulk.

SOLE MANUFACTURERS OF THE

FLEMMING GENERATOR GAS FURNACE

Brooklyn Fire Brick Works,

OFFICE AND WORKS:
88 VAN DYKE ST., BROOKLYN, N. Y.
MANUFACTURERS OF

CLAY GAS RETORTS & SETTINGS, GENERATOR LININGS. SPECIALTIES.

Established 1854. Incorporated 1869.

LACLEDE
Fire Brick Manufg. Co.,

Manufacturers of { GAS RETORTS . .
FIRE BRICK . . .
RETORT SETTINGS

Water Gas Cupola Linings, Fire Clay, Etc.

Proprietors for the U. S., Coze System of Inclined Benches.

Estimates Furnished on Application for Most Successful Style of Construction.

Also for Free-Firing and Full and Half-Depth Regenerative Benches, for Burning either Coal or Coke in the Furnaces.

Office: Cor. Manchester and Sulphur Avenues, St. Louis, Mo.

GEORGE R. ROWLAND,
Formerly with the Continental Iron Works.
Draughtsman and Constructing Engineer.
Drawings, Specifications and Estimates furnished for the construction of new works or alteration of old works. Special attention given to Patent Office drawings.
Office, No. 245 Broadway, N. Y. City.

FIELD'S ANALYSIS FOR THE YEAR 1903.
An Analysis of the Principal Gas Undertakings in England, Scotland and Ireland. Being the 35th year of publication. Compiled and arranged by JOHN W. FIELD, Sec'y and Gen. Mgr. of The Gas Light and Coke Company, London. Price, $5. For Sale by
A. M. CALLENDER & CO., 42 Pine St., New York City.

Adam Weber Sons.

GENERAL OFFICES: Park Row Bldg., N. Y. City.
DEPOT & WAREHOUSES: 639 E. 15th St., N. Y. City.
WORKS: Weber, N. J.

ERECTION OF

Modern Coal Gas Plants,

With either Horizontal, Inclined or Vertical Retorts.

PATENTS APPLIED FOR.

No. 1. Firing horizontal benches with pulverized fuel, with either 8 or 10 retorts in 1 setting, using one furnace for two benches. Great saving in labor, fuel and life of retorts and settings. No elaboration of complex recuperation.

No. 2. Independent retort settings, taking all weight from retorts.

No. 3. Vertical retorts with vertical charge and discharge. Sixteen retorts in one bench.

MODERN BENCH IRONWORK.

ISAAC C. BAXTER, President. ESTABLISHED 1864. PETER YOUNG, Secretary and Treas.

Works. LOCKPORT STATION, PA.

JAMES GARDNER, JR., CO.,

Address all communications to JAMES GARDNER, JR., CO., Room 202 Lewis Bldg., PITTSBURG, PA.

Successor to WILLIAM GARDNER & SON.

Fire Clay Goods for Gas Works.

HENRY MAURER & SON,
(ESTABLISHED 1856.)
EXCELSIOR FIRE BRICK & CLAY
RETORT WORKS
WORKS, Perth Amboy, N. J.
OFFICE, 418 to 422 East 23d St., N. Y.

Clay Gas Retorts,
BENCH SETTINGS,
Fire Brick, Tiles, Etc.

GEROULD'S IMPROVED RETORT CEMENT
A Cement of great value for patching retorts, putting on mouthpieces, making up all bench-work joints, lining blast furnaces and cupolas. This cement is mixed ready for use. Economic and thorough in its work. Fully warranted to stick.
Price List, f.o.b. BLOOMINGTON, INDIANA.
In Casks, 400 to 800 pounds, at 5 cents per pound.
In Kegs, 100 to 200 " " 6 " "
In Kegs less than 100 " " 7 " "

C. L. GEROULD, BLOOMINGTON, IND.
For orders East of Buffalo, N. Y., or Pittsburg, Pa., freight will be paid to these points.

Bristol's Recording
PRESSURE GAUGE.
For continuous records of Street Gas Pressure.
Simple in construction, accurate in operation and low in price.
Fully Guaranteed. Send for Circulars.
THE BRISTOL CO.,
Waterbury, Conn.
Silver Medal, Paris Exposition.

GASHOLDER TANKS AND GAS WORKS MASONRY COMPLETE.
Plans prepared and Estimates furnished at short notice.
J. P. WHITTIER,
238 Java Street, Brooklyn, N. Y.

THEO. J. SMITH, Prest. J. A. TAYLOR, Sec
A. LAMBLA, Vice-Prest. and Supt.

BALTIMORE
RETORT & FIRE BRICK CO.
MANUFACTORY AT
LOCUST POINT, BALTIMORE, MD.

Clay Retorts, Blocks & Tiles
FIRE BRICK, FIRE CLAY, AND FIRE CEMENT.
Our Improved Half and Full Depth Benches have been Adopted by Many Gas Companies.
WALDO BROS., 102 MILK ST., BOSTON, MASS.
Sole Agents for New England States.

JOHN DELL,
President and General Manager.

MISSOURI FIRE BRICK CO.,

ESTABLISHED 1882.

MANUFACTURERS OF

Gas Retorts, Bench Settings, Fire Brick, Cupola Linings, Etc.

We are the **Exclusive Agents** *for the* **Mitchell Patent Benches,** *Constructed with Half or Full Depth Furnaces, to Burn either Coal or Coke, and Arranged for Front or* **Rear Clinkering.** *The* **Mitchell** *is the* **Original Coal Firing Bench.** *We also Erect Plain Benches with* **One** *to* **Six Retorts.**

YOUR CORRESPONDENCE IS RESPECTFULLY SOLICITED.

City Office: *411 Olive Street, Continental Bank,* ST. LOUIS, MO.

Bronder Patent Stoking Machinery.

Three-Scoop and Three-Rake Charging and Discharging Machines are operating in New York, Newark, N. J., Philadelphia, Worcester, Mass., Mt. Vernon, N. Y., Toronto and Montreal, Canada.

Four-Scoop and Four-Rake Charging and Discharging Machines are operating in Detroit, Mich.

These are the only machines that will draw or charge simultaneously 3 or 4 retorts (vertically) and handle from 42 to 60 retorts in from 25 to 30 minutes, lid opening and closing and filling of furnaces included.

Hot Coke Conveyor, Quencher and Steam Exhauster, operating in Toronto, Canada, working in water-sealed flue, rollers being protected from heat and grit.

COAL CRUSHERS, CONVEYORS AND BINS. TURNTABLES FOR MACHINES.

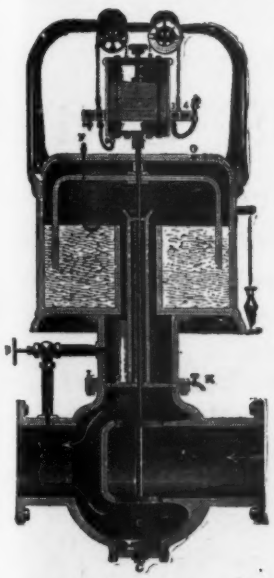
Labor-Saving Machines for Handling Coal and Coke from Coal Cars to Coke Yard or Bins, a Specialty.

G. A. BRONDER,

Contracting Engineer and Builder,

229 BROADWAY, NEW YORK.

CONNELLY IRON SPONGE AND GOVERNOR CO.,



S. F. HAYWARD, Treas. S. P. HAYWARD, Gen. Mgr. F. C. SLADE, Engineer.

DESIGN, CONSTRUCTION AND EXTENSION

— OF —

COAL AND WATER GAS PLANTS,

AUTOMATIC BALANCE, HIGH PRESSURE AND SERVICE GOVERNORS,

ROOTS' IMPROVED EXHAUSTERS.

IRON SPONGE FOR GAS PURIFICATION, JONES JET PHOTOMETERS, PRESSURE REGISTERS, ETC.,

PLANS AND ESTIMATES FURNISHED COMPANIES CONTEMPLATING BUILDING, EXTENDING OR IMPROVING. WIDE EXPERIENCE IN HIGH PRESSURE INSTALLATION.

395 BROADWAY, NEW YORK. 788 SOUTH CANAL ST., CHICAGO, ILLS.

ARTHUR R. CRUSE, President. FRANK FLAVELL, Secretary. AARON E. KEMPER, Treasurer.

Cruse=Kemper Company,

PHILADELPHIA OFFICES: Stephen Girard Building. - - WORKS: Ambler, Pa.

Manufacturers of

Triple, Double and Single=Lift Gasholders,

With or Without Metal Tanks,

Oil and Water Tanks, Purifier Covers, General Plate Metal Work, and Steel Water Towers.

Plans, Specifications and Estimates Promptly Furnished on Request.

Chollar's System of Gas Purification.

THE PURIFIED GAS REVIVES THE FOULED OXIDE.

Practical Photometry,

By William Joseph Dibdin.

Price, - - - - $3.00.

FOR SALE BY

A. M. CALLENDER & CO.,

No. 42 Pine Street, New York City.

JAMES D. PERKINS, President. F. SEAVERNS, Treasurer.

THE PERKINS COMPANY,

228 and 229 Produce Exchange, New York City.

TIDEWATER SALES AGENTS FOR THE FOLLOWING:

Ocean Mine Youghiogheny Gas Coal,
Old Kentucky Shale and O. K. Boghead.

SHIPMENTS FROM NEW YORK, PHILADELPHIA, BALTIMORE AND NORFOLK.

BERWIND-WHITE COAL MINING COMPANY'S

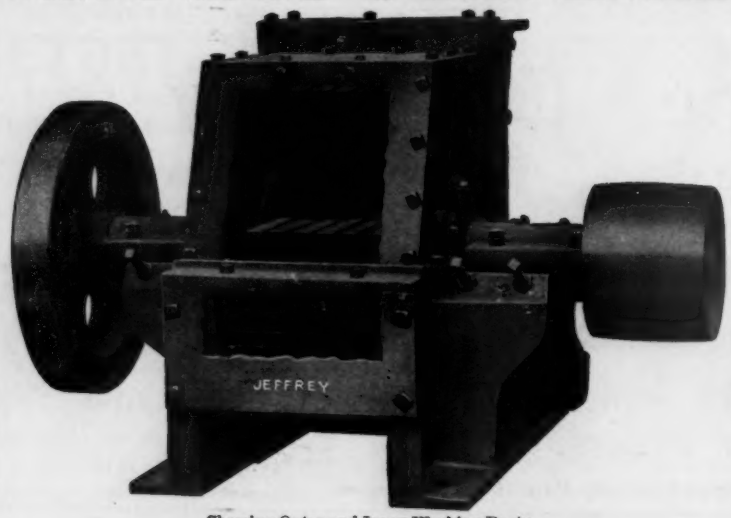
Ocean Westmoreland Gas Coal.

Offices:
Washington Building, New York.
Betz Building, Philadelphia.

STRICTLY High Grade. . . . .
Carefully Prepared.
For Gas Making or
Heavy Steaming. .

A. C. M. AZOY, General Agent, 1 Broadway, New York.

WE ARE READY
TO DEMONSTRATE THE SUPERIORITY
OF
JEFFREY PULVERIZERS



Showing Outer and Inner Working Parts.

By
FREE CRUSHING TESTS.

A Few Strong FEATURES:

Accessibility of Working Parts.

Substantial Pillow Blocks.

Material Partly Crushed in Suspension.

Simplicity in Changes of Parts.

Catalogue No. 30 contains full information. Mailed free with others on

ELEVATING-CONVEYING, POWER-TRANSMITTING.

THE JEFFREY MFG. CO., COLUMBUS, OHIO, U. S. A.
New York, Pittsburg, Chicago, Denver, Charleston, W. Va.

The Gas Engineer's Laboratory Handbook,

By JOHN HORNBY, F.I.C. Price, $2.50.

Orders may be sent to

A. M. CALLENDER & CO., 42 Pine St., N. Y.

COAL TAR
—AND—
AMMONIA.

Third and Enlarged Edition.

BY
GEORGE LUNGE, Ph.D.

Price, $15. For Sale by
A. M. CALLENDER & CO.,
42 Pine Street, New York City.

SELF-INSTRUCTION
For Students in Gas Manufacture.

Price, $1.25. For Sale by
A. M. Callender & Co.,
42 Pine Street, New York City.

ELECTRIC GAS LIGHTING.

How to install electric gas igniting apparatus, including the jump spark and multiple systems for use in houses, churches, theaters, halls, schools, stores or any large building. Also, the care and selection of suitable batteries, wiring and repairs.

By H. S. NORRIE.

Price, 50 cents. Orders may be sent to
A. M. CALLENDER & CO., 42 PINE ST., N. Y. CITY.

KELLER ADJUSTABLE COKE CRUSHER.

Strong, Simple, Durable. Will Crush any Size Desired.

C. M. KELLER,
Sec. & Supt. Gas Lt. & Coke Co.,
Columbus, Ind.
Correspondence Solicited.

POOLE ON FUELS.

THE CALORIFIC POWER OF FUELS.

By HERMAN POOLE, F.C.S.

Second Edition. Price, $3. For Sale by

A. M. CALLENDER & CO., 42 PINE ST., N.Y. CITY.

The Gas Engineer's Laboratory Handbook,

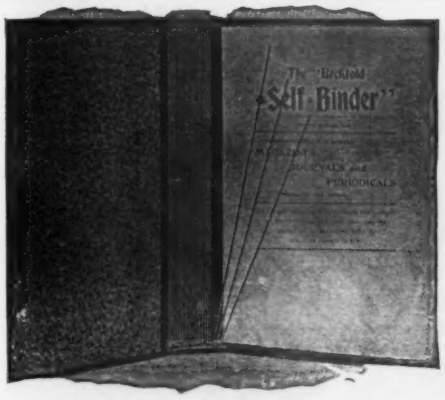
By JOHN HORNBY, F.I.C.

Price, $2.50.

FOR SALE BY

A. M. CALLENDER & CO.,
42 Pine Street, New York City.

BINDER for the JOURNAL.



Price, $1.00.

A. M. CALLENDER & CO., 42 Pine Street, N.Y.

EDMUND H. McCULLOUGH, President. CHAS. F. GODSHALL, Treasurer. H. C. ADAMS, Secretary. HENRY WHARTON, Assistant Secretary.

THE WESTMORELAND COAL CO.

Chartered 1854.

Mines situated on the Pennsylvania and the Baltimore and Ohio Railroads, in Westmoreland County, Pa.

POINTS OF SHIPMENT:

PHILADELPHIA, BALTIMORE, SOUTH AMBOY, N. J.,
WATKINS (SENECA LAKE), N. Y.

Since the commencement of operations by this Company its well-known Coal has been largely used by the Gas Companies of New England and the Middle States, and its character is established as having no superior in gas-giving qualities, and in freedom from sulphur and other impurities.

Principal Office, 224 South 3d St., Phila., Pa.

SUN COMPANY,

PRODUCER, REFINER, SHIPPER AND EXPORTER OF
Petroleum and All Its Products.

Pittsburg, Pa., and Philadelphia, Pa.

THE SUN OIL CO.

Gas Oil, Gas Naphtha,
Refined Oil, Lubricating Oils.

Toledo, O., and Pittsburg, Pa.

BROWNHOIST CRANES

FOR LIFTING PURIFIER COVERS IN GAS HOUSES.

WRITE FOR PARTICULARS.

The Brown Hoisting Machinery Co.,

1436 St. Clair Street, Cleveland, O.
217 Havemeyer Building, New York.

PRACTICAL HANDBOOK ON

GAS ENGINES,

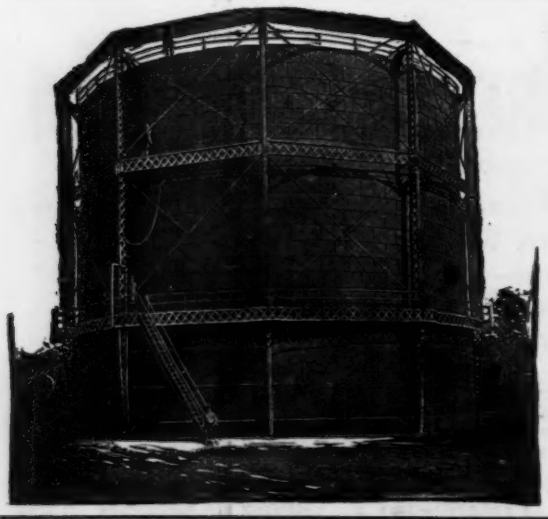
With Instructions for Care and Working of the Same,

By G. LIECKFELD, C.E.

Translated with Permission of the Author, GEO. M. RICHMOND, M.E.

PRICE, $1.00.

A. M. CALLENDER & CO., 42 Pine Street, New York City.



DAVIS & FARNUM MFG. CO.,

Principal Office and Works, Waltham, Mass.

Single, Double and Triple-Lift Gasholders of any Capacity. Tubular, Pipe and Sinuous Friction Condensers of all Sizes.

Steel Tanks for Gasholders, Iron Roof Frames and Floors, Purifying Boxes, Center Seal or Valve Connections, Bench Work, Reversible Lime Trays.

Self-Sealing and Pressed Steel Mouthpiece Lids.

Coke Barrows, Coal Wagons, and all Apparatus Requisite for a Complete Gas Works.

Also, Gas and Water Pipe, Flanged Pipe, Sugar House Work, and Special Castings of all Descriptions.

BAXTER & YOUNG,

CONTRACTING AND CONSULTING GAS ENGINEERS.

Examination and Values Ascertained of Artificial and Natural Gas Properties.

COMPLETE GAS WORKS ERECTED.

Artificial and Natural Gas Mains Furnished and Laid.

GAS PROPERTIES PURCHASED.

OFFICE: WAYNE COUNTY BANK BUILDING,

Rooms 201 & 202. DETROIT, MICH.

Geo. Shepard Page's Sons.

GAS MACHINERY.

Correspondence Solicited.

180 Fulton Street, New York City.

THE

Valuation of Gas, Electricity and Water Works

FOR ASSESSMENT PURPOSES.

THOS. NEWBIGGING, M.Inst.C.E., and WM. NEWBIGGING, Assoc.M.Inst.C.E.

With an Appendix of Decided Cases.

Second Edition. Price $2. For Sale by

A. M. CALLENDER & CO.,

42 Pine Street, N. Y. City.

DAVID LEAVITT HOUGH,

Consulting Engineer

AND

CONTRACTOR,

PARK ROW BUILDING, N. Y.

PAINTS FOR METAL.

We Sell 70 Per Cent. of the Gasholder and Meter Paints Used.

National Paint Works,

Established 1876.

WILLIAMSPORT, PA.

Great Northern Bldg., Chicago. 92 William St., New York

Write to New York Office for a free copy of our book on Technical Paints.

KERR MURRAY MANUFACTURING COMPANY,

Engineers and Manufacturers

APPARATUS FOR COAL GAS PLANTS,

SINGLE AND DOUBLE-LIFT GASHOLDERS AND STEEL TANKS,

Latest Improved

ROTARY EXHAUSTERS, P. & A. TAR EXTRACTORS, AMMONIA WASHERS,

CONDENSING, SCRUBBING AND PURIFYING APPARATUS.

Street Specials and Valves.

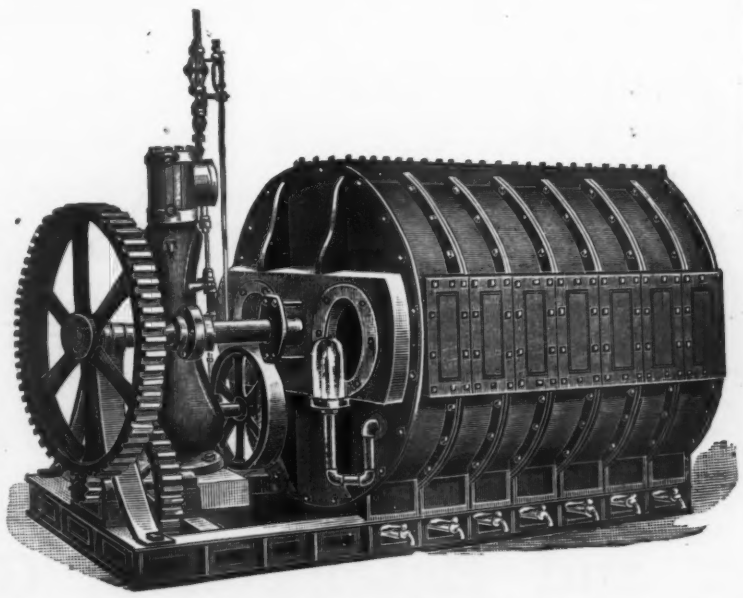
ADDRESS:

KERR MURRAY MANUFACTURING COMPANY, {FORT WAYNE, IND.

BARTLETT, HAYWARD & CO.

BALTIMORE, MD.

Designers and Builders of Gas Works.



Sole Lessees the Wilkinson Water Gas Process.

PATENT STANDARD WASHER-SCRUBBER.

The best apparatus for the extraction of all Ammonia and a large proportion of Carbonic Acid and Sulphureted Hydrogen. The Scrubber has been materially improved and is provided with patented Wooden Segmental Grids, instead of Metallic Discs, thus reducing the weight on shaft and power for operating same.

Coal and Water Gas Installations of the Most Modern and Complete Types.

BENCHES WITH INCLINED RETORTS.

System Stettiner Chamotte Fabrik, Actien Gesellschaft, of Stettin, Germany.

GASHOLDERS OF ALL SIZES.

General Western Agents, THE LLOYD CONSTRUCTION CO., of Detroit, Mich.

QUINTARD IRON WORKS,

N. F. PALMER,

Foot of 12th St. & East River, New York,

MANUFACTURERS OF

GAS APPARATUS.

Complete Works Erected.

FREDERICK W. FLOYD, Engineer.

ALEX. C. HUMPHREYS, M.E., M. Inst. C.E. ARTHUR G. GLASGOW, M. E., M. Inst. C.E.

HUMPHREYS & GLASGOW,

CONSULTING ENGINEERS.

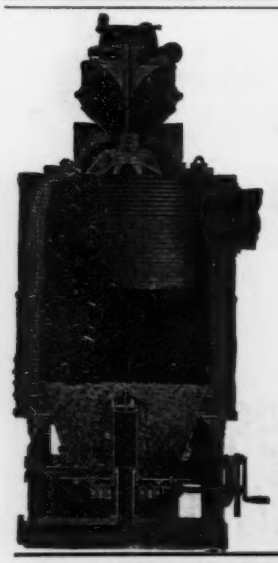
BANK OF COMMERCE BLDG., 31 Nassau Street, New York.

38 VICTORIA STREET, London S.W., England.

ADVICE AS TO EXTENSION AND RECONSTRUCTION OF GAS AND ELECTRICITY PLANT.

COMPLETE EXAMINATIONS MADE.

PROPERTIES PURCHASED.



R. D. WOOD & CO.,

400 CHESTNUT STREET, PHILADELPHIA,

—BUILDERS OF—

Gas Power Plants with Producers,

The best Producers for either Bituminous, Anthracite Coal or Lignite. Less labor required and less waste than in any other Producer. Send for Pamphlet. : : : :

CAST IRON PIPE.

HYDRAULIC TOOLS. HYDRAULIC OPERATING VALVES.

J. S. DE HART, JR., President. R. K. WEHNER, Treasurer. A. F. WEHNER, Secretary.

ISBELL-PORTER CO.,

ENGINEERS AND CONTRACTORS FOR THE

Construction and Extension of Gas Works.

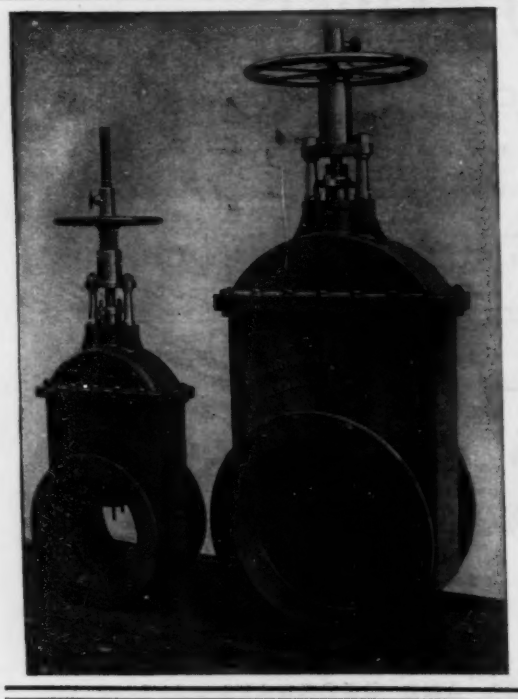
TOTAL ROTARY AMMONIA SCRUBBERS SOLD:

129,556,000 Cubic Feet Daily Capacity.

TOTAL WALKER TYPE TAR EXTRACTORS SOLD:

40,100,000 Cubic Feet Daily Capacity.

OFFICE AND WORKS: Bridge and Ogden Streets, Newark, N. J.



Double Gate Valves.

A LARGE STOCK ON HAND READY FOR PROMPT SHIPMENT.

These valves are provided with double discs or gates, and are tight with the gas pressure on either side of them.

The discs are so arranged as to be free from their seats when being opened or closed, and are operated by a quick-acting mechanism. The valve stem extends outside of the bonnet, and serves as an index, showing whether the valve is closed or open, and the amount of opening. They are made of the following dimensions:

Size.	8 Inches.	10 Inches.	12 Inches.	16 Inches.	20 Inches.	24 Inches.	30 Inches.	36 Inches.
Diameter of flanges.....	13 inches.	16 inches.	18 inches.	22½ inches.	27 inches.	33 inches.	37½ inches.	44 inches.
Face to face of flange...	12 inches.	12 inches.	12 inches.	14 inches.	17 inches.	20 inches.	21 inches.	23½ inches.

For price and other information, apply to

THE CONTINENTAL IRON WORKS,

NEW YORK (BOROUGH OF BROOKLYN).

P. O. STATION G.

Directory of American Gas Companies, 1904.

Price, $5.00.

For Sale by

A. M. Callender & Co., 42 Pine St., N. Y.

THE STACEY MANUFACTURING COMPANY,

MANUFACTURERS AND BUILDERS OF

GASHOLDERS AND STEEL TANKS

OF ANY SIZE AND DESCRIPTION,

AND ALL IRONWORK AND MACHINERY REQUIRED IN A GAS PLANT

Also Oil Storage Tanks, Steel Roofs, Stand Pipes, Etc.

We also manufacture Lamp Posts, Gas Valves, all size and shape Castings, Etc.

Makers of Apparatus for THE CHOLLAR PROCESS OF PURIFICATION.

Plans, Specifications and Estimates Cheerfully Furnished on Request.

GENERAL OFFICES AND WROUGHT IRON WORKS:
Elmwood Place, Ohio. 'Phone, "Park 384."

FOUNDRY AND CAST IRON WORKS:
No. 239 Mill Street, CINCINNATI, OHIO. 'Phone, "West 690."

RITER-CONLEY COMPANY,

GASHOLDERS, with or without Steel Tanks.

Purifiers, Condensers, Scrubbers, Oil Tanks, Smoke Stacks.

STEEL ROOFS and BUILDINGS.

PLATE AND STRUCTURAL WORK OF EVERY DESCRIPTION.

GENERAL OFFICE: Pittsburg, Pa. EASTERN OFFICE: 39-41 Cortlandt St., New York City.

J. ALEX. MAYERS,

No. 56 PINE ST., · · NEW YORK CITY,

GAS ENGINEER AND CONTRACTOR

FOR THE ERECTION OF

COMPLETE GAS WORKS

OR ANY PART THEREOF.

CORRESPONDENCE PROMPTLY ANSWERED.

PRACTICAL PHOTOMETRY,

By WILLIAM JOSEPH DIBDIN,

PRICE, $3. FOR SALE BY

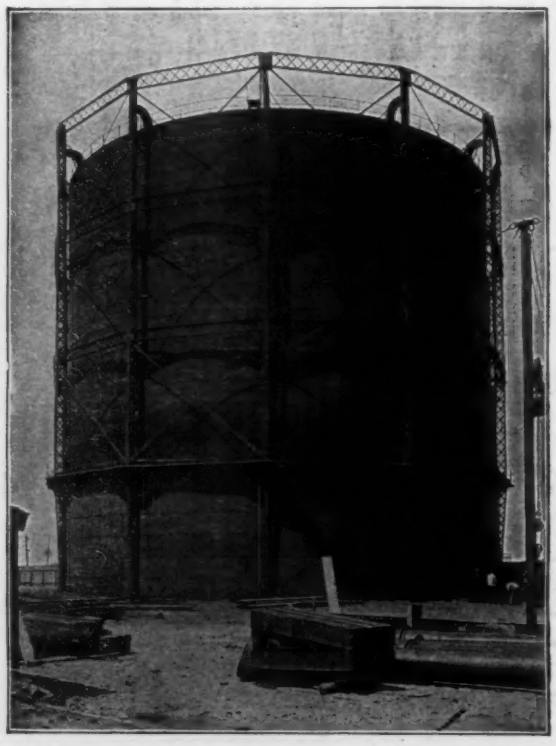
A. M. CALLENDER & CO., 42 Pine Street, New York City.

The Gas Engineer's Laboratory Handbook,

By JOHN HORNBY, F.I.C.

Price, $2.50.

A. M. CALLENDER & CO., 42 Pine St., N.Y. Ci



Deily & Fowler,

39 Laurel Street, Philadelphia, Pa.

(ESTABLISHED 1842),

BUILDERS OF

GASHOLDERS,

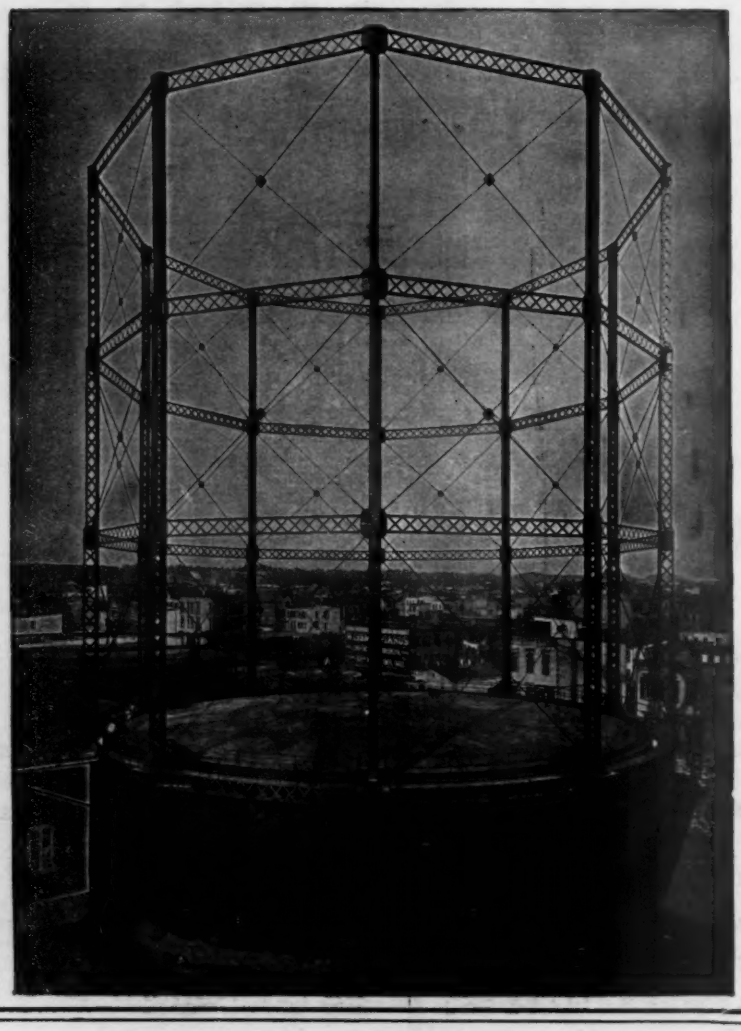
Single-Lift or Telescopic,

With or Without Steel Tanks.

Oil Storage Tanks, Water Tanks, Etc.

ESTIMATES CHEERFULLY FURNISHED.

CORRESPONDENCE SOLICITED.



The order for this Triple-Lift Holder and Steel Tank was received by the Logan Iron Works from the Union Gas Light Company, of East New York. The contract was completed and the Holder was in actual use in 90 days from receipt of order. Capacity of Holder, 500,000 cu. ft.

LOGAN IRON WORKS,

Brooklyn, N. Y.,

MANUFACTURERS OF

Single or Multiple-Lift

GASHOLDERS,

Complete, with Steel Tanks.

BENCHES, SCRUBBERS,

CONDENSERS,

PURIFIERS, IRON ROOFS,

AND ALL PARTS OF

GAS WORKS APPARATUS.

Contractors for

Complete Works.

Newbigging's Handbook for Gas Engineers and Managers.

PRICE, $6.50.

A. M. CALLENDER & CO., 42 Pine Street, New York City.

Established 1854.

D. McDONALD & CO.,

MANUFACTURERS OF

WET AND DRY METERS, STATION METERS AND METER PROVERS.

ALSO MAKERS OF

THE GLOVER PREPAYMENT METER.

The amount of gas delivered for the coin can be instantly and positively changed without removing the meter or replacing any parts.

The gas registered agrees absolutely with the amount purchased by the coin.

WE HAVE MADE AND SOLD IN THE UNITED STATES

OVER 120,000 OF THESE METERS,

ALL OF WHICH ARE GIVING PERFECT SATISFACTION.

Correspondence Solicited.

561 West Forty-seventh Street, NEW YORK. | 51, 53 & 55 Lancaster Street, ALBANY, N. Y. | Jefferson and Monroe Streets, CHICAGO.

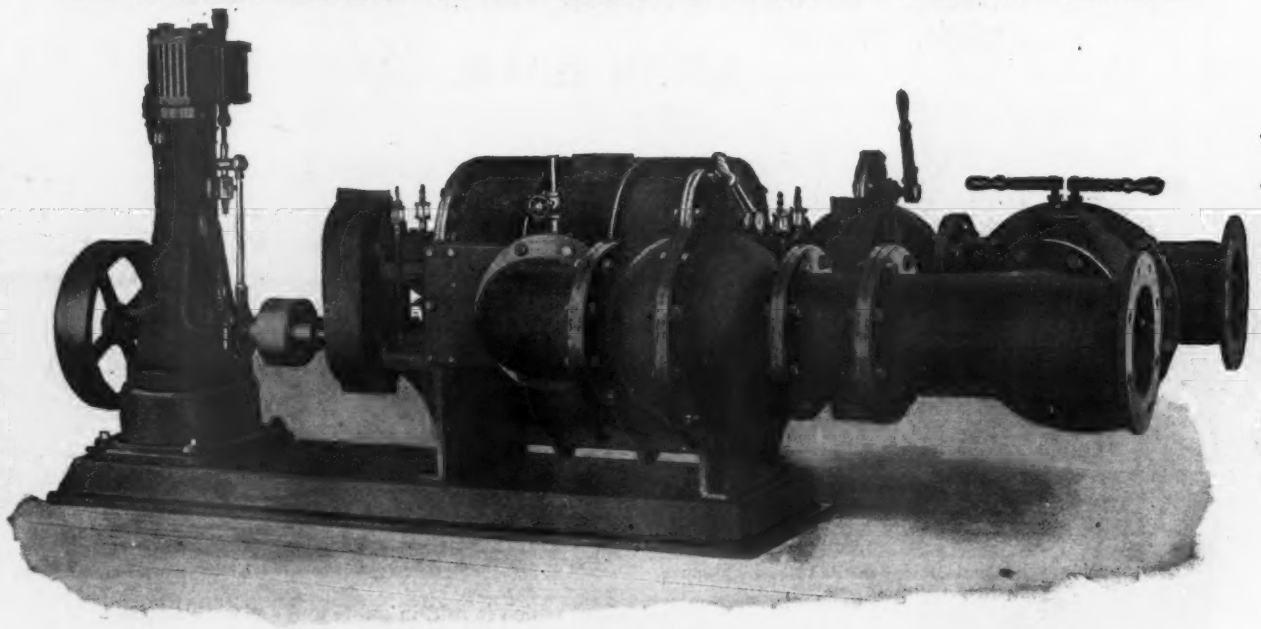
GAS EXHAUSTERS

AND

HIGH PRESSURE GAS PUMPS.

OUR HORIZONTAL MACHINES CAN BE ARRANGED FOR EITHER TOP OR BOTTOM DISCHARGE.

Vertical Gas Exhauster with direct connected vertical engine on bedplate; Gas Valves, By-Pass Valve and Fittings.



We build them to be driven by Pulley, Engine or Motor. If desired we can furnish Flexible Couplings for large units.

SEND FOR CATALOGUE AND ASK US QUESTIONS.

THE CONNERSVILLE BLOWER CO.,

EASTERN OFFICE: 95 Liberty St. **HOME OFFICE & WORKS: Connersville, Indiana, U. S. A.**

We Have Sold Over 50,000 of Our

PREPAYMENT GAS METERS

IN NEW ENGLAND.

We Have Fitted Up Over 10,000 Idle Regular Meters with Our

PREPAYMENT ATTACHMENT.

Can be Attached to Any Make of Meter.

NATHANIEL TUFTS METER COMPANY, 8 MEDFORD STREET, BOSTON, MASS.

MARYLAND METER CO.,

BALTIMORE, North and Saratoga Streets. CHICAGO, 88 to 92 Jackson Boulevard.

CONSUMERS' AND STATION METERS, PRESSURE GAUGES, ETC.

SPECIAL ATTENTION GIVEN TO ALL REPAIR WORK.

"Have you Seen our Complaint Meter?"

WHEN YOU SEND REPAIRS TO US

They can be changed to Prepayment, Prepayment and Beal Straight-reading, or Beal Staight-reading only. Good job. Good time. Good people. Write us.

KEYSTONE METER CO., Royersford, Pa.

DETROIT STOVE WORKS

"Largest Stove Plant in the World"

MANUFACTURES AND SELLS

DETROIT JEWEL GAS APPLIANCES

FOR COOKING and HEATING,

All about which is told in a fine and strictly "to-the-point" catalog, sent upon request to Gas Companies.

DETROIT, MICH. CHICAGO, ILLS.

AMERICAN METER CO.,

NEW YORK, ST. LOUIS, PHILADELPHIA, SAN FRANCISCO, CHICAGO,

Wet and Dry Gas Meters, Station Meters, Meter Provers,
Photometrical Apparatus, Gauges,

PREPAYMENT METERS,

REGULAR METERS REFITTED WITH PREPAYMENT ATTACHMENTS.

HELME & McILHENNY,

Established 1848. **1339 to 1349 Cherry Street, Philadelphia, Pa.**

MANUFACTURERS OF

Wet and Dry Gas Meters, Station Meters, Provers, Gauges, Etc.

METERS REPAIRED

PREPAYMENT GAS METERS.

Our Own Patents. Strong. Simple. PROMPT ATTENTION. CORRESPONDENCE SOLICITED.

METRIC METAL COMPANY,

MAKERS OF

GAS METERS for NATURAL and ARTIFICIAL GAS.

Special Attention given to Repairing METERS of all Makes.

FACTORY AT ERIE, PA.

EXCERPTS FROM DECISIONS

—OF THE—

BOARD OF GAS COMMISSIONERS of the COMMONWEALTH OF MASSACHUSETTS.

MR. E. H. YORKE, NEW HAVEN, CONN., Dec. 1, 1898.

Dear Sir: I am in receipt of a copy of "Excerpts from the Decisions of the Board of Gas Commissioners," which is a handy compilation in book form of extracts from the most recent decisions of the Gas Commission of Massachusetts.

I note that most of these extracts are broad and safe-guiding precepts, which apply with equal force to one Company as to another. The 13 years' existence of the Board of Gas Commissioners, with its unusual opportunities for acquiring information, have justly made it a high and safe authority in all matters pertaining to the management, obligations and rights of Gas Companies. Your little book will serve as a valuable reference library in settling legal complications which often arise between a Gas Company and its customers.

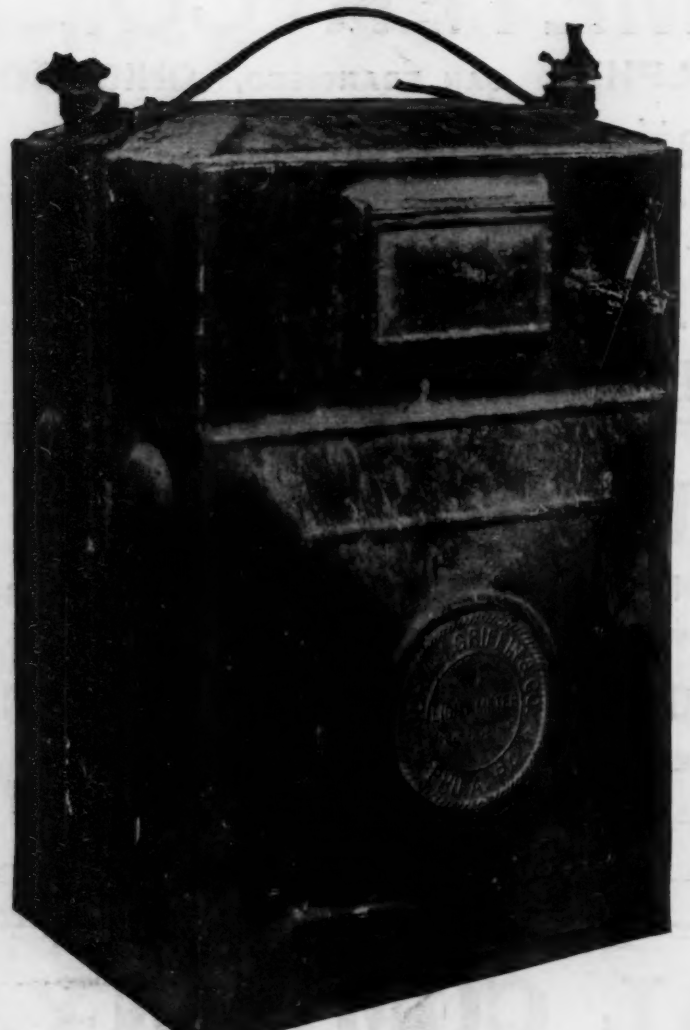
Yours truly, (Signed) F. C. SHERMAN, Superintendent.

☞ A 28-page Pamphlet, containing the cream of this Board's decisions as to the proper management of Gas Companies.

Compiled by E. H. YORKE. Price, $1.00. Address,

A. M. CALLENDER & CO., 42 PINE ST., NEW YORK CITY.

BEFORE.



This is a photograph of a 3-light regular meter out of a lot of meters received from the Coatesville Gas Co., Coatesville, Pa., to be repaired and converted into prepayment meters.

AFTER.

This is the same meter after it has been repaired and converted into a new prepayment meter.

If you have some ordinary meters to be repaired, send them to us and let us repair and convert them into prepayment meters. They will be a source of satisfaction and profit to you.

JOHN J. GRIFFIN & CO.,

1513 TO 1521 RACE STREET,

559 West 47th Street, NEW YORK.

PHILADELPHIA.

Jefferson and Monroe Streets, CHICAGO.

OVER 170,000 OF THE POSITIVE PREPAYMENT METERS ARE IN USE IN THE UNITED STATES.

SEND FOR OUR BOOKLET.